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ANALYZING THE PERCEPTIONS OF THE GENERAL PUBLIC WITH REGARD TO MEAT PRODUCTION IN THE U.S.: A SPOTLIGHT ON PORK PRODUCTION AND THE IMPACTS OF THE FAIR OAKS FARMS' PIG ADVENTURE

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ANALYZING THE PERCEPTIONS OF THE GENERAL PUBLIC WITH REGARD TO MEAT PRODUCTION IN THE U.S.: A SPOTLIGHT ON PORK PRODUCTION AND THE IMPACTS OF THE FAIR OAKS FARMS' PIG ADVENTURE

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For my family, thank you for your love, encouragement, and endless support.

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TABLE OF CONTENTS

Page

LIST OF TABLES

Table Page

Table Page

Table Page

LIST OF FIGURES

Figure Page

ABSTRACT

Cummins, Ann M. M.S., Purdue University, December 2015. Analyzing the Perceptions of the General Public With Regard to Meat Production in the US: A Spotlight on Pork Production and the Impacts of the Fair Oaks Farms' Pig Adventure. Major Professor: Nicole Olynk Widmar.

Consumers have an increasing amount of information available to them while make purchasing decisions for livestock products. This information increasingly includes both production and product components. It is evident that along with this increasing amount of available information consumers also have an increased interest in farming practices associated with the rearing of livestock. Therefore, it is important to have an increased understanding in consumer's perceptions and level of concern for production attributes, such as animal welfare, relative to product attributes such as taste and price. This analysis examines United States residents' demographics, knowledge, sources of information, and perceptions on livestock rearing practices. This analysis reveals that the majority believe that the agriculture industry is important in the state they reside. This analysis also shows that production practices for the rearing of pigs that are of concern to consumers include the housing practices at different stages of production, particularly in crates. In addition, this analysis examines people's choices when making forced tradeoffs between pork attributes (which include both production attributes, such as animal welfare, and product attributes, such as price and taste). Correlations were used to

provide insight in terms of the importance of several different factors including consumer demographics, knowledge level and agritourism participation in relation to these forced tradeoffs. This analysis found that animal welfare was third most important (from the attributes studied) and that shares of preference for animal welfare were positively correlated with lifestyle factors such as owning a cat or dog.

CHAPTER 1. INTRODUCTION

There is currently evidence throughout the world and in the United States' markets of increasing interest by consumers in how food is being produced. The current model for animal production (or large scale livestock production) has become highly contentious in spite of the fact that it allows for optimized production efficiencies that ultimately lead to an abundance of reasonably low cost foods. Consumers' interests in livestock production, and ultimately livestock-derived food products, is expressed in many ways including their levels of awareness and concern about the animals' life (while being raised), and by the attributes of the food items they choose to purchase in the food market place. Such attributes include price, environmental impact and production processes. Since supermarkets have begun to offer a variety of options for meat and milk products it is now possible for consumers to have purchase options including "grass fed beef" or "free range chicken," effectively marketing the food product in terms of how the farm animal lived its life. Thus, consumers are increasingly able to make choices based on the food product in front of them as well as how the animal that produced it was raised.

Given consumers' increased ability to make purchase decisions in the market place based on how the livestock animal lived its life, it is of particular interest in this

study to gain understanding about what influences consumers perceptions, and ultimately their consumption behavior. In order to gain understanding this analysis includes a deeper examination into where consumers get their information, how knowledgeable they are about production practices, how familiar they are with agriculture, and their perspectives of the livestock industries.

Most United States residents are not employed in agriculture, but 98% are consumers of livestock-derived food products[1]. Only 1.5% of the population is employed in the agriculture industry (U.S. Census Bureau, 2012) and not all of the 1.5% is involved in livestock production, leaving an even smaller percentage employed in the livestock section of the agriculture industry. This results in a significant gap between the number of people involved in livestock production and those consuming livestock products. There are, however, many other avenues for consumers to become familiar with agriculture and ways to develop thoughts on animal treatment that can end up influencing consumers' willingness to pay for different attributes of livestock products in the grocery store. It is critical to determine which factors have the most influence on beliefs and attitudes about United States animal agriculture and, therefore, how best to inform the public and other key stakeholders about the strengths and limitations of different United States food animal production systems. The multitude of factors that impact consumers' preferences for livestock food products is not completely understood. Emotion, science, and economic factors all influence consumers' shopping experiences and ultimately help determine household purchasing decisions.

[1] With approximately 2 percent (Vegetarian Times, 2008) of the US population being vegan, the remaining 98% of the population are consumers of products from the livestock sector.

There are many avenues through which consumers can learn or be influenced about livestock production including the media, information outlets, household participation in agriculture or growing processes, and participation in agritourism. The agriculture industries in general have been supportive of, or at least widely engaged with, exploring ways to educate the end consumer. One specific area of interest is exploring and better understanding the influence made of bringing consumers to the farm, particularly via agritourism. Understanding the ability to influence consumers' purchasing decisions based on directly exposing consumers to what actually happens in the production process is of interest to the industry. The hypothesis proposed by some is that if consumers see how livestock animals are raised, they will then be less concerned about animal welfare, and the current production process, and will thus purchase differently at the supermarkets. However, it is not necessarily the case that additional information will lead to more positive outlooks and perceptions by consumers; it is possible that increased exposure to how animals are raised (or simply more animal exposure of any kind) will actually increase consumers' concern for the welfare of animals.

From a market and economic standpoint, the primary topic of interest surrounds better understanding what consumers' desire and which livestock attributes consumers find more important and ultimately are willing to pay for. This analysis examines different pork attributes and their importance, relative to one another, for consumers, and seeks to provide better understanding of the differences between visitors and non-visitors of agritourism locations in the relative ranking of importance of these pork attributes. This research leads the way for future analysis to determine what practices are of concern

and how much people are willing to pay for different products produced with certain practices of animal treatment.

This thesis uses a set of three distinct samples: United States residents, Five-state Region (Illinois, Indiana, Michigan, Ohio and Wisconsin) residents, and Indiana residents. All three surveys were administered as mutually exclusive samples by Lightspeed GMI. The survey administration and programming was conducted at Purdue University to assure the appropriate breakdown of respondents in the sample was achieved. In particular, the focus of this analysis is to examine the impact of visiting educationally oriented livestock operations on purchasing behaviors, perceptions, and attitudes of United States residents and highlighting Fair Oaks Farms[2]' Pig Adventure.

The objectives of this research are to analyze the nature and level of public concerns associated with different food animal production systems and to understand the socio-cultural and demographic factors relationship to these. To do this, the first section of the analysis examines the consumer demographics, views, and perceptions of the United States national sample. The second set of analysis examines responses to a question that forced tradeoffs between pork attributes to determine relative importance of these attributes to consumers. This analysis will better examine consumers' forced tradeoffs between pork production attributes in terms of the importance of several different factors including consumer demographics, knowledge level and agritourism

[2] Fair Oaks Farms is located in Fair Oaks, Indiana. "The goal for Fair Oaks Farms, is to educate the public about modern farming procedures while providing a transparent look at everything we do, taking care of our animals and our planet and providing the best, most nutritious products to our customers." from http://fofarms.com/blog/

participation. This analysis leads the way for further analyses using a series of designed choice experiments to elicit consumer demand and purchasing preferences.

CHAPTER 2. PERCEPTIONS OF UNITED STATES RESIDENTS: ANIMAL AGRICULTURE AND MEAT PRODUCTS IN 2014

2.1 Introduction

The United States is the world's largest meat consumer on a per capita basis (USDA, 2005). Pork consumption per capita is ranked third in meats in the United States, following beef and chicken (USDA, 2005). An average of 51 pounds of pork per person per year is consumed in the United States (USDA, 2005). The total United States pork consumption is projected to maintain growth due to the continued expansion in United States population (USDA, 2005). That said, there are some differences in the demographics, religious views, and personal preferences that impact individual consumption. This chapter focuses on understanding and quantifying the nature and level of United States consumers' concerns associated with different food animal production systems, highlighting pork. This chapter also focuses on understanding national consumers' demographics, views, perceptions and level of familiarity with livestock production (specifically via agritourism) in the United States.

2.2 Research Methods and Data

2.2.1 Survey Instrument

Consumers' perspectives were collected using an online survey conducted in Qualtrics. The survey was administered July 23, 2014 through August 6, 2014 by Lightspeed GMI, the manager of a large opt-in survey panel. The sample was targeted to be nationally representative in terms of gender, age, pre-tax income, and region of residency. The regions of residency were defined using "Census Regions and Divisions of the United States" defined by the U.S. Department of Commerce Economics and Statistics Administration of the U.S. Census Bureau (Accessed 2014). All respondents were required to be at least 18 years old. Information collected included general household lifestyle and travel, familiarity with livestock production practices, pork purchasing behaviors, agritourism experience, and perceptions of pork production and livestock products.

According to the National Telecommunications and Information Administration and Economics and Statistics Administration in the U.S. Department of Commerce (NTIA and ESA, 2013), the use of the Internet to collect survey responses instead of traditional mail or phone data collection methods have become an increasingly common survey data collection approach since the late 1990's with the beginning of the commercialization of the Internet in the United States. Internet surveys, with their lower costs and rapid completion times, are becoming increasingly popular (Louviere et al., 2008; Gao and Schroeder, 2009; Olynk, Tonsor and Wolf, 2010; Tonsor and Wolf, 2010;

Olynk and Ortega, 2013). Hudson et al. (2004) found that Internet surveys did not exhibit non-response bias. In addition, Fleming and Bowden (2009) and Marta-Pedroso, Freitas and Domingos (2007) found no significant differences when comparing results of Web-based surveys, conventional mail, and in-person interviews. According to Dillman (2007) the web survey is “a much more sophisticated survey method which has far more flexibility and power”. While some differences are discussed, it is noted that “while the technology is relatively new, the general principles that govern people’s decisions to respond are not new” (Dillman, 2007). Now, “The United States has made considerable progress towards ubiquitous broadband access, with more than 93 percent of the population living in areas offering wired broadband service, and about 98 percent having access to either wired or terrestrial wireless connectivity at speeds of at least 3 Mbps download and 768 Kbps upload” (NTIA & ESA, 2013). With such high rates of access to the internet as well as the flexibility and power it provides, web surveys are now common and increasingly considered an acceptable and reasonable survey data collection method.

2.2.2 Sample Summary Statistics and Demographics

The survey is comprised of 1,004 completed responses. table 1 shows the demographics of the survey respondents compared with the census statistics for age (U.S. Census Bureau, 2010 Census, Revised 2014), gender (U.S. Census Bureau, 2010 Census, Revised 2014), income (U.S. Census Bureau, 2008-2012), and population by region of residency (U.S. Census Bureau, 2010 Census, Revised 2013). Respondents were required to be at least eighteen years old. As seen in table 2.1, this sample had slightly more

respondents from the Midwest region and slightly fewer respondents from the West region than desired. Also, the sample had slightly fewer respondents from the two highest income categories than desired; the remaining categories were fairly similar to the census data.

The survey asked participants several additional demographic questions, these questions were of particular interest when analyzing consumers' consumption of meat and perceptions of livestock rearing and farm animal welfare. The collection of these additional demographics and responses is displayed in table 2.2. These results include the education level of the participants. According to the U.S. Census Bureau (2012) 87% of Americans over the age of 25 were at least high school graduates and 30% had completed at least four years of college. This sample is slightly "overeducated", with 98% of respondents having graduated from high school and 44% of respondents receiving at minimum a bachelor's degree. A potential reason this sample is overeducated is due to the fact that in order to participate, one must respond to the survey online, and therefore must have access to a computer and internet, as well as be literate.

Given that the study looked primarily at meat consumption, focusing on pork as well as animal welfare perspectives, it is valuable to understand the percent of vegetarian and vegan respondents. In this survey, 4% of respondents were vegetarian and 2% were vegan. A Vegetarian Times study found in 2008 that 3.2% of United States population was vegetarian and 0.5% vegan (Vegetarian Times, 2008).

It is hypothesized that close relations to animals of any species have the potential to influence peoples' perceptions of animal welfare for livestock and food production. McKendree and Widmar (2013) in a national survey of consumers found that 66% of

United States households owned a pet, with 48% and 41% of households owning dogs and cats, respectively. Similar to their findings, this survey found 46% of participants owned at least one dog, and 40% indicate they owned one or more cats

Table 2.1 Sample Summary Demographic Statistics (n=1004)

Variable Description	Survey	Census
	Frequency (%)	Frequency (%)
Female	50	51
Age		
18 to 24 years	8	13
25 to 44 years	39	35
45 to 64 years	36	35
65 years and over	17	17
Household Income		
Less than $25,000	22	23
$25,000-$34,999	11	11
$35,000 - $49,999	15	14
$50,000 - $74,999	20	18
$75,000 - $99,999	13	12
$100,000 - $149,999	13	13
$150,000 or more	6	9
Region		
Northeast	19	18
South	37	38
Midwest	24	22
West	20	22

Table 2.2 Sample Summary Statistics (n=1004)

Variable Description	Survey Frequency (%)
Education	
Did not graduate from High School	2
Graduated from High School	18
Attended College, No Degree Earned	22
Attended College, Associate or Trade Degree Earned	14
Attended College, Bachelor's (B.S. or B.A.) Degree Earned	29
Graduate or Advanced Degree (M.S., Ph.D., Law School)	15
Other	0
Vegetarian	4
Vegan	2
Pet Owner	
Cat owner	40
Dog Owner	46
Household Has Experienced in the Past Six Months:	
Divorce	5
New Marriage	7
Moving	15
Death	13
Serious Illness	14
Start of New Job	16
Loss of Job	13
Serious Financial Distress	18
Political Affiliation	
Democratic Party	29
Republican Party	26
Independent	32
None of the above	13
Race	
White, Caucasian	84
Black, African American	7
Asian, Pacific Islander	3
Mexican, Latino	4
American Indian	0
Other	2

2.3 Results and Discussion

2.3.1 Household Lifestyle and Travel

When studying consumers' perceptions of livestock production and animal welfare, understanding a person's proximity to agriculture and food production is helpful to gain insight into their familiarity with agricultural production. There are different ways that people can be familiar with agriculture; they can own or operate farm businesses or have relatives who farm, but they can also be familiar on a smaller scale with home-based food production for personal consumption. In addition, individuals can have some level of familiarity with agriculture through touring or visiting agricultural operations or agritourism locations.

According to U.S. Census Bureau (2012) 1.5% of people are employed in the agricultural industry. In this survey 6% of participants indicate that they owned or operated a farm business in any capacity including a partnership or part-owner, and 8% had a family member or relative who owns or operates a farm business. The majority, 88%, indicated that they had no direct relationship to agricultural business ownership or operation, meaning that they themselves do not operate a farm business and they do not have a family member who does either. The percentage of participants who indicated that they owned or operated a farm business of any capacity is high (6% compared with the expected 1.5% of the United States population who is employed in agriculture (Bureau of Labor Statistics, 2013)). When respondents were asked to state their industry of employment 1.6% stated agriculture from the options of: agriculture, mining,

construction, manufacturing, government, retail, healthcare, transportation, education, self-employed, retired, stay-at-home parent, student, unemployed or other. It is hypothesized that the difference between the 1.6% who indicated their industry of employment is agriculture, and the 6% who indicated that they own or operate a farm business in any capacity is due to people who are part-owner and employed in other industries, or from people who own such things as hobby farms but whose employment comes from other industries.

Regardless of whether participants are directly involved in owning or operating of farming operations, households can be involved in the production of food for personal consumption. Participants were asked to identify which type of food producing activities their household had been involved in within the last three years, if any. The options presented included:

- Cultivating fruit trees and/or berries
- Growing produce of any kind in a personal garden at home
- Growing produce of any kind in a personal garden not at home (in a garden plot or community garden)
- Raising chickens primarily for eggs
- Raising chickens primarily for meat
- Raising animals (other than chickens) for meat or milk

Figure 2.1 shows that the most common household production practice, 31% of participant's households, had grown a personal garden at home. The second most commonly selected activity was cultivating fruit trees and/or berries with 13% of participants reporting this activity. Sixty-five percent of participants indicated that their

household did not participate in any of the activities over the last three year. Overall, 20% of participants reportedly only participated in one of the activities listed, 8% participated in two activities, and 6% indicated participation in three or more activities in the past three years.

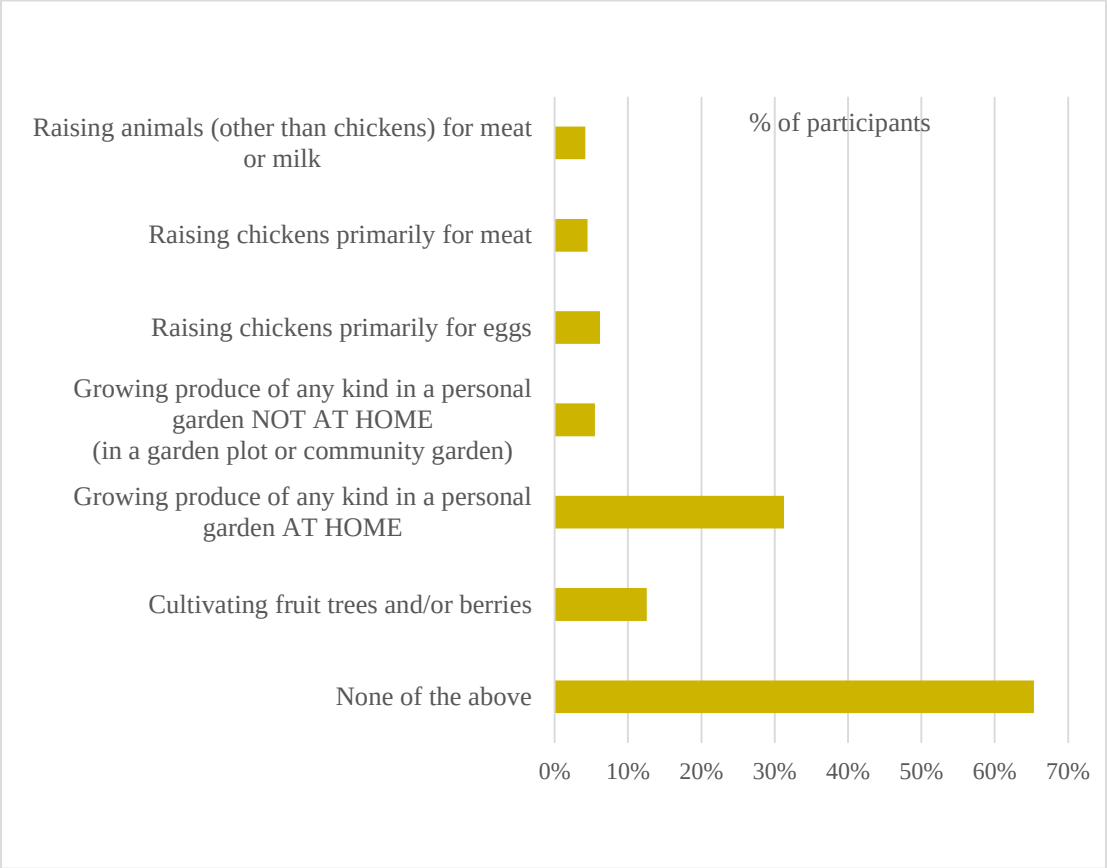


Figure 2.1 National Household Home Production Participation (n=1004)

Other than personal involvement in food production, residents could also experience agricultural production through agritourism. In order to gain deeper insight on participants' agritourism activities the survey asked participants three different sets of questions. One set of questions asked participants to indicate the last time they visited fifteen different operation types including museums, amusement parks, animal related visits, and food production operations. A second set of questions asked about the distance

participants had traveled for tourism of any kind and their primary reason for visiting an agritourism operation. Third, the survey asked participants to identify their primary reason for visiting an agritourism location. The combination of these three sets of questions allows for a deeper understanding of which households are traveling to agritourism locations and reasons why they travel to these type of locations.

Approximately 52% of all participants stated that they have traveled more than 250 miles (total round trip) from their home to go to an attraction or family outing in the previous 6 months. When asked about visits to different attraction types, only 5% of respondents indicated that they had never been to any of the potential tourism locations listed. Sixteen percent of respondents indicated they had gone to five or fewer of the operations, 37% who had gone to between six and ten of the operations, and 42% had gone to eleven or more. Figure 2.2 shows the percentage of participants who indicated they had visited each of the different tourism locations investigated. Amusement parks, museum of any kind, and national or state park were the top three most visited operation types with 91%, 88%, and 85% participants visiting respectively. Pig farms, fish hatcheries, corn maze, and food plant or production tours were the location types that had the smallest percentage of participants indicate they had visited.

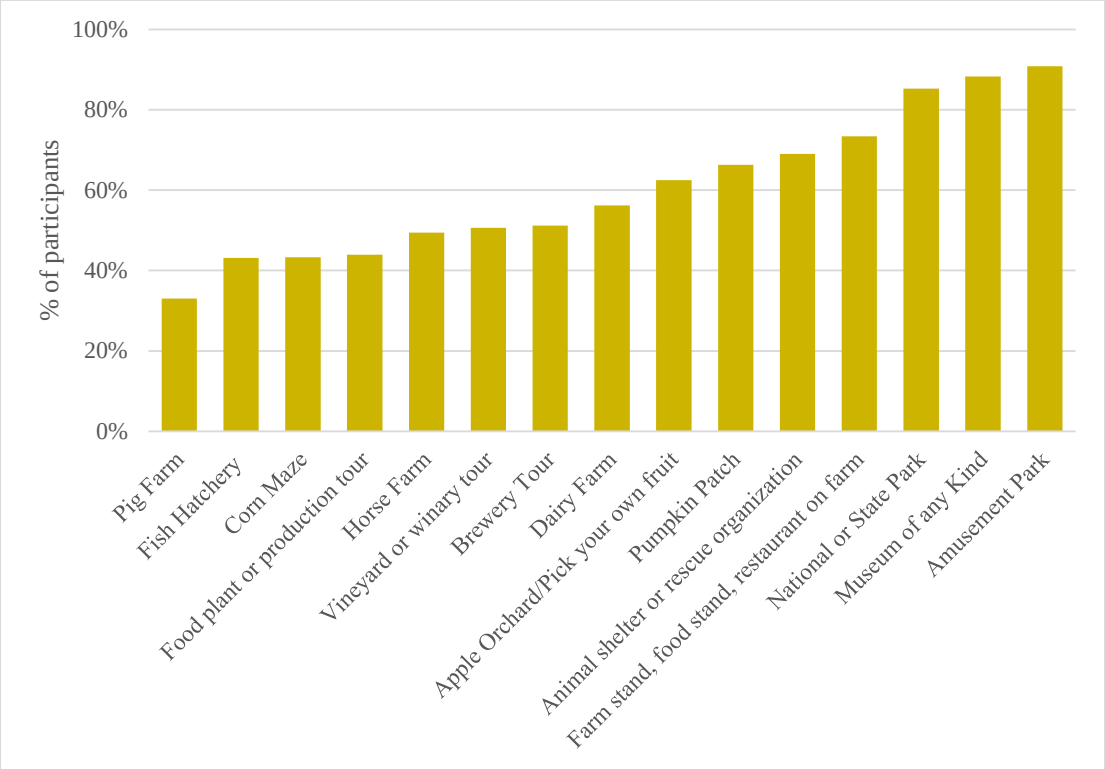


Figure 2.2 Tourism Locations Visited (n=1004)

Figrue 2.3 shows the results of participants responses when asked to identify the most appealing primary reason for their household to visit an agritourism location. As seen in figure 2.3, the largest group of participants, 34%, selected “education”, followed by 32% who selected “to obtain food”, 28% who selected “entertainment”, and 6% that selected “other” as the primary reason their household would visit an agritourism location.

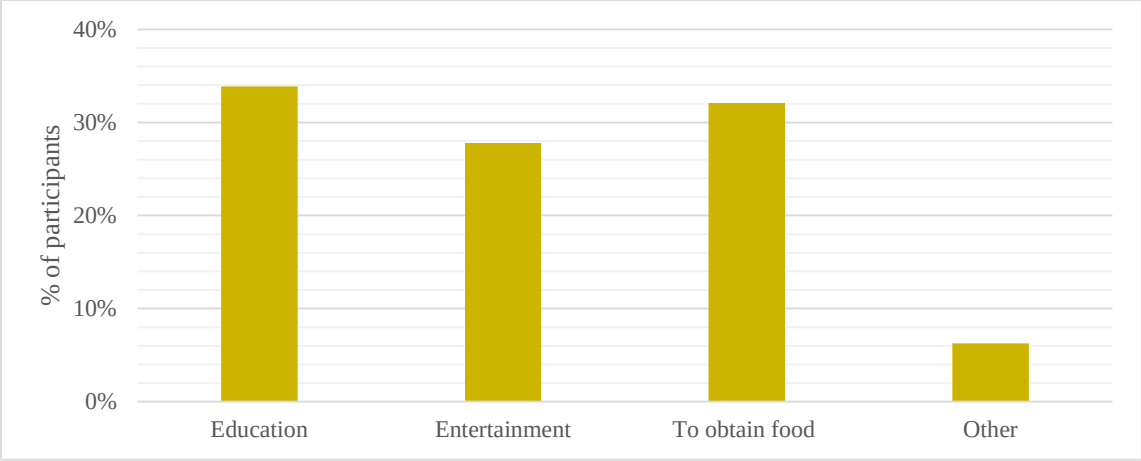


Figure 2.3 The Most Appealing Primary Reason for Visiting an Agritourism Location (n=1004)

2.3.2 Consumption of Food Products

Some questions within the survey sought to gain insight on consumption behaviors for different food products. These questions sought information regarding household weekly food expenditures, locations where the household purchased different food categories, and how frequently households purchased pork products.

This survey instructed participants to indicate the primary location for the purchase of food, which was divided into four categories: dairy, meat, produce/fruit/vegetables, and “all other food categories”. For every food category, the majority of participants indicated that the primary location of purchase was retail supermarkets. Specifically looking at the meat category, as seen in figure 2.4, 78% of all respondents indicated that their primary location for purchasing meat was in retail supermarkets followed by 11% primarily purchase meat at specialty food stores, 5% purchase from other locations, 4% purchase meat at farmers markets or direct from farmers, and 0% purchase meat from convenience stores.

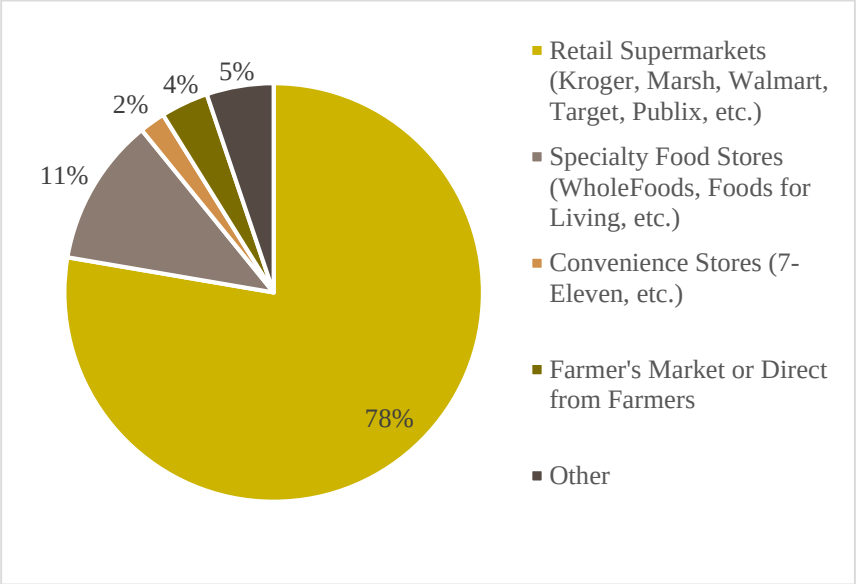


Figure 2.4 Primary Location for Purchasing Meat (n=1004)

Eighty three pecent of participants stated that they have purchased pork products within the last year. To gain insight on the frequency of purchase for different livestock products, participants were asked to identify how frequently they purchased different pork products, as well as the frequency of purchasing milk. Results are presented in figure 2.5. The majority of respondents indicated they purchase milk on a “weekly or more often” basis. The response “monthly” was the most common response chosen regarding the frequency of purchase for the products bacon, ham lunchmeat, pork chops, and pork sausage. Smoked ham had the largest number of participants’ indicating that they have purchased “in the last 6 months but not within the last month”.

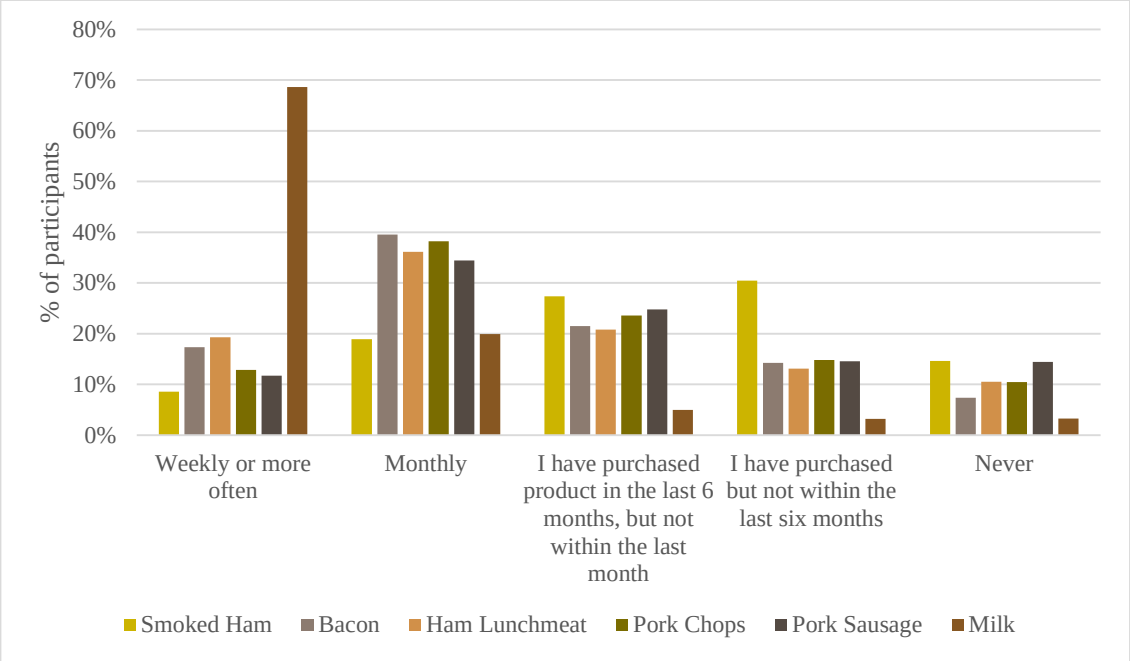


Figure 2.5 Typical Frequency of the Purchase of Livestock Products (n=1004)

2.3.3 Familiarity with Animal Agriculture

In addition to household lifestyle and production practice experiences, self-reported familiarity with animal agriculture was assessed to gain a better understanding of how educated consumers were, or perceived themselves to be, about livestock production. In the survey these two questions were asked: 1) “What type of food consumer/purchaser do you consider yourself?”(figure 2.6) and 2) “How educated do you consider yourself regarding farming and agriculture in the United States?” (figure 2.7). The participants responded on a scale of one to seven where one indicated they considered themselves to be extremely uneducated and seven indicated they considered themselves extremely educated. The mean response to the type of food consumer/purchaser was 5.23, while the mean response of 3.92 was found for how

educated they considered themselves regarding farming and agriculture in the United States. These results imply participants considered themselves slightly uneducated about food production and agriculture, but educated about food consumption. This disconnect might mean that people feel educated about what they are eating and where they are getting it, but less educated about food production processes used to produce their food.

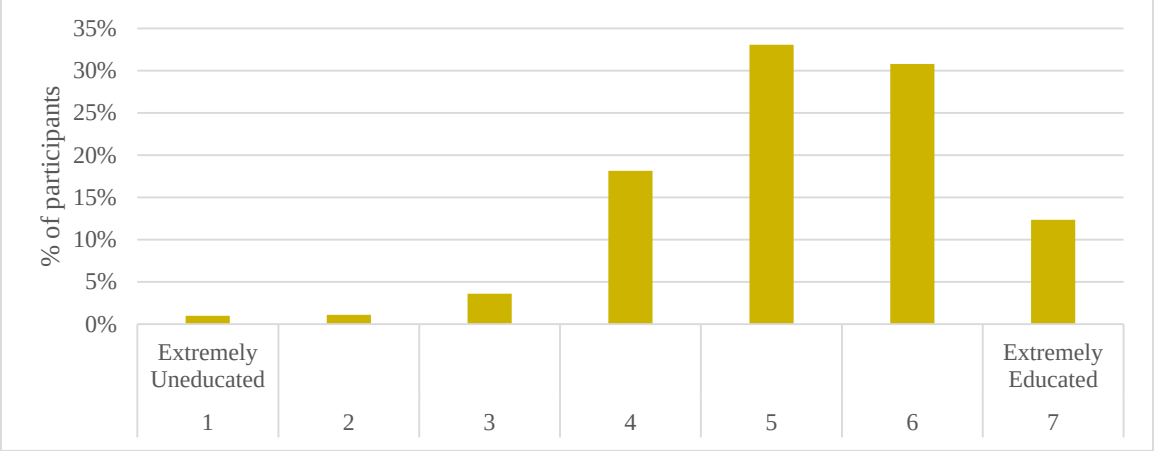


Figure 2.6 What Type of Food Consumer/Purchaser Do You Consider Yourself? (n=1004)

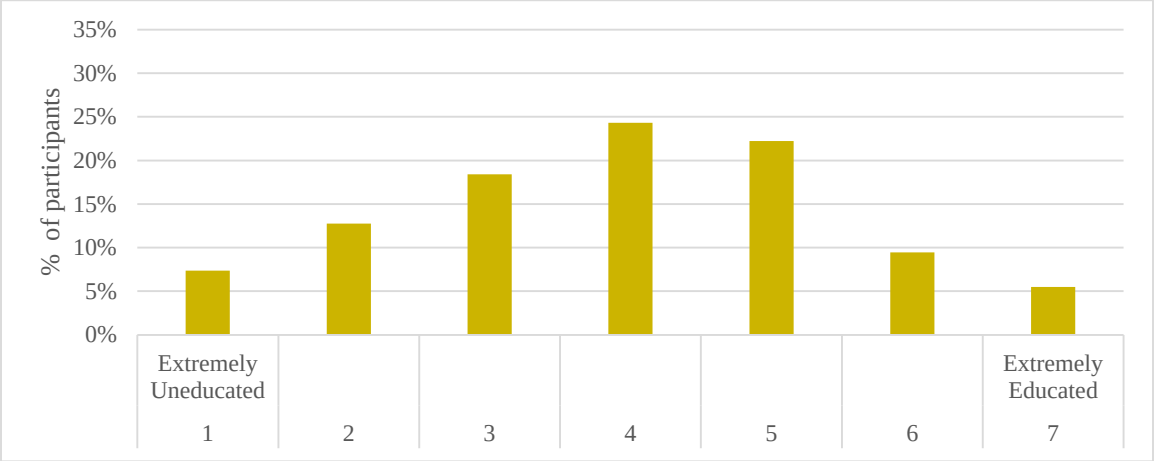


Figure 2.7 How Educated Do You Consider Yourself Regarding Farming and Agriculture in the United States? (n=1004)

To gain insight on how familiar respondents are with various aspects of animal production, the participants were asked several different questions about livestock

animals in general, and agricultural production practices. Participants were asked to identify the life expectancy in years (decimals were allowed) for a dairy cow on a dairy farm, beef cow on a beef (cow-calf) farm/ranch, egg producing/laying hen, indoor house cat, and a pig raised for pork. Results from these questions can be found in table 2.3.

Table 2.3 Estimated Life Expectancy of Animals (n=1004)

	Dairy Cow	**Beef Cow**	**Egg Producing Hen**	**Indoor House Cat**	**Pig Raised for Pork**
Mean	10.38	6.06	5.00	12.58	4.09
Median	10	4	5	14	3
Mode	10	2	5	15	2

With the exception of the indoor house cat, the mean, median, and mode life expectancies reported for the dairy cow, egg producing hen, and pig raised for pork were all significantly higher than the actual average age of these animals. The beef cow on a cow-calf operation offers an interesting case in which the mean was approximately six years, but the median was four years and the mode was two years of age. Potentially participants misunderstood the difference between a beef cow, which would generally produce calves annually for a number of years, versus a beef animal raised for slaughter. However, aside from the beef cow, the significant overestimation of age is thought-provoking. In general, the mean age reported by participants is significantly higher than the actual ages of these production animals. Researchers may explore the impact of providing information about the actual life expectancies of these animals in future studies.

This study also asked participants what they believed was the most common size of a pig farm, as well as what farm size represents a majority of the operations used to

raise pigs for pork in the United States. According to the USDA-NASS (2013), 71% of pig farms have 0-99 pigs and 5% of pig farms have more than 5,000 pigs for pig farms in the United States (USDA-NASS, 2013). The majority of pigs raised in the United States, 62%, come from farms with more than 5,000 pigs (USDA-NASS, 2013). Therefore, while the majority of pig farms are small, most pork originates from pigs raised on large operations that are limited in number. Figure 2.8 and 2.9, illustrate that the majority of participants believed the most common pig farm size is 100-499 pigs, which is slightly larger than reality. They also indicated that they believed that the majority of pork is coming from a farm that has far fewer pigs than is typical for United States pork suppliers.

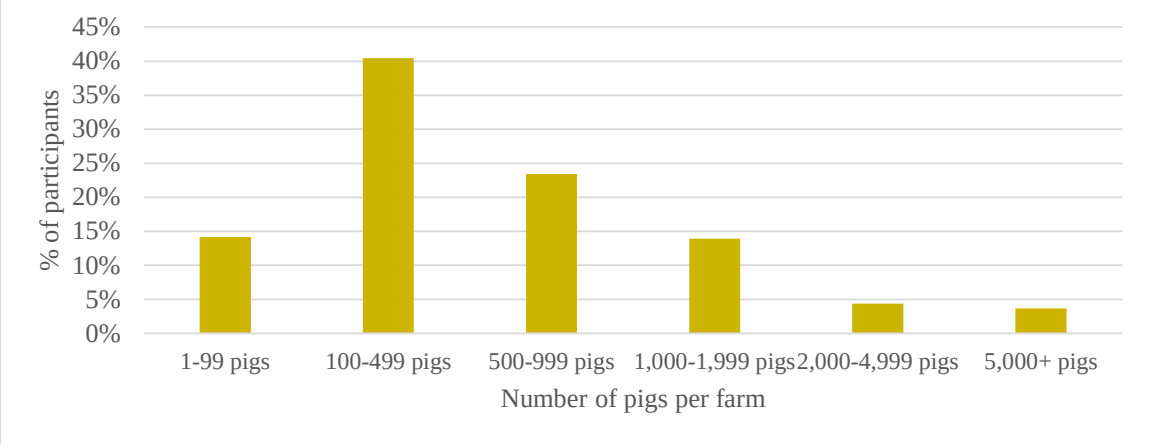


Figure 2.8 Consumers Perception of the Most Common Size of Pig Farm in the United States (n=1004)

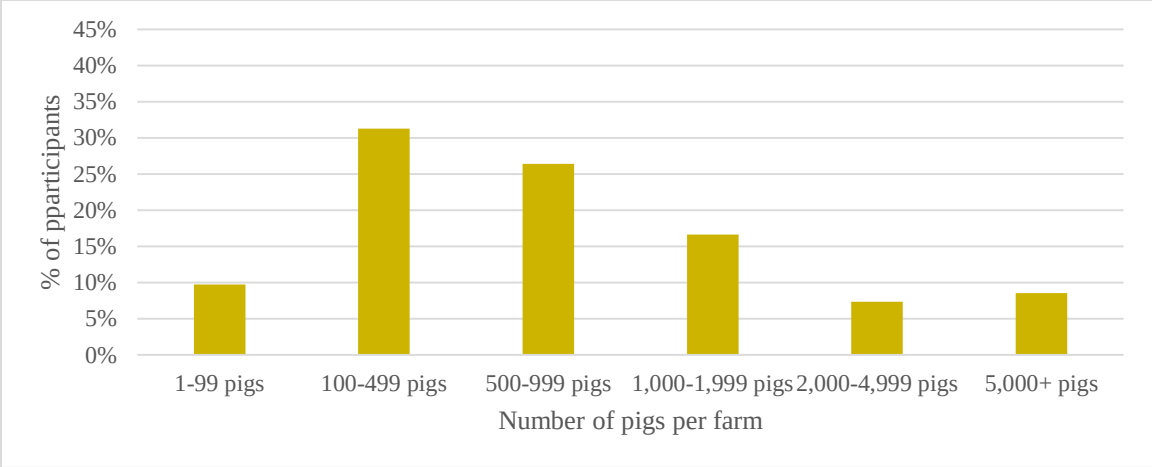


Figure 2.9 Consumers Perception of the Farm Size on Which the Majority of Pigs Raised for Pork in the U.S. are Raised (n=1004)

To gain deeper insight into consumers' knowledge about pork production, nine statements regarding pigs raised for pork in the United States was presented to participants. The survey asked participants to identify the statements shown as either true or false. Results revealed that the majority of participants believed the majority of pigs raised for pork in the United States were born and raised on the same farm, had access to the outdoors for some portion of each day, were not fed vegetarian diets, were treated with antibiotics in times other than when sick, were not raised on farms with less than 100 total pigs, were raised in group housing systems, were not raised in individual pens, were raised in situations where they are permitted to have social interactions with other pigs, and were raised on farms with more than 1,000 total pigs. Results are displayed in figure 2.10. The majority of responses were incorrect, implying that participants are unfamiliar with how pigs are currently raised for pork in the United States.

In general, the majority of respondents thought they were highly educated about food but do not consider themselves to be educated about agriculture. This implies that in consumers' minds there is some difference between being an educated food consumer

and being educated about agriculture and food production. Regardless of how educated individuals identify themselves, there are clearly some gaps in basic knowledge.

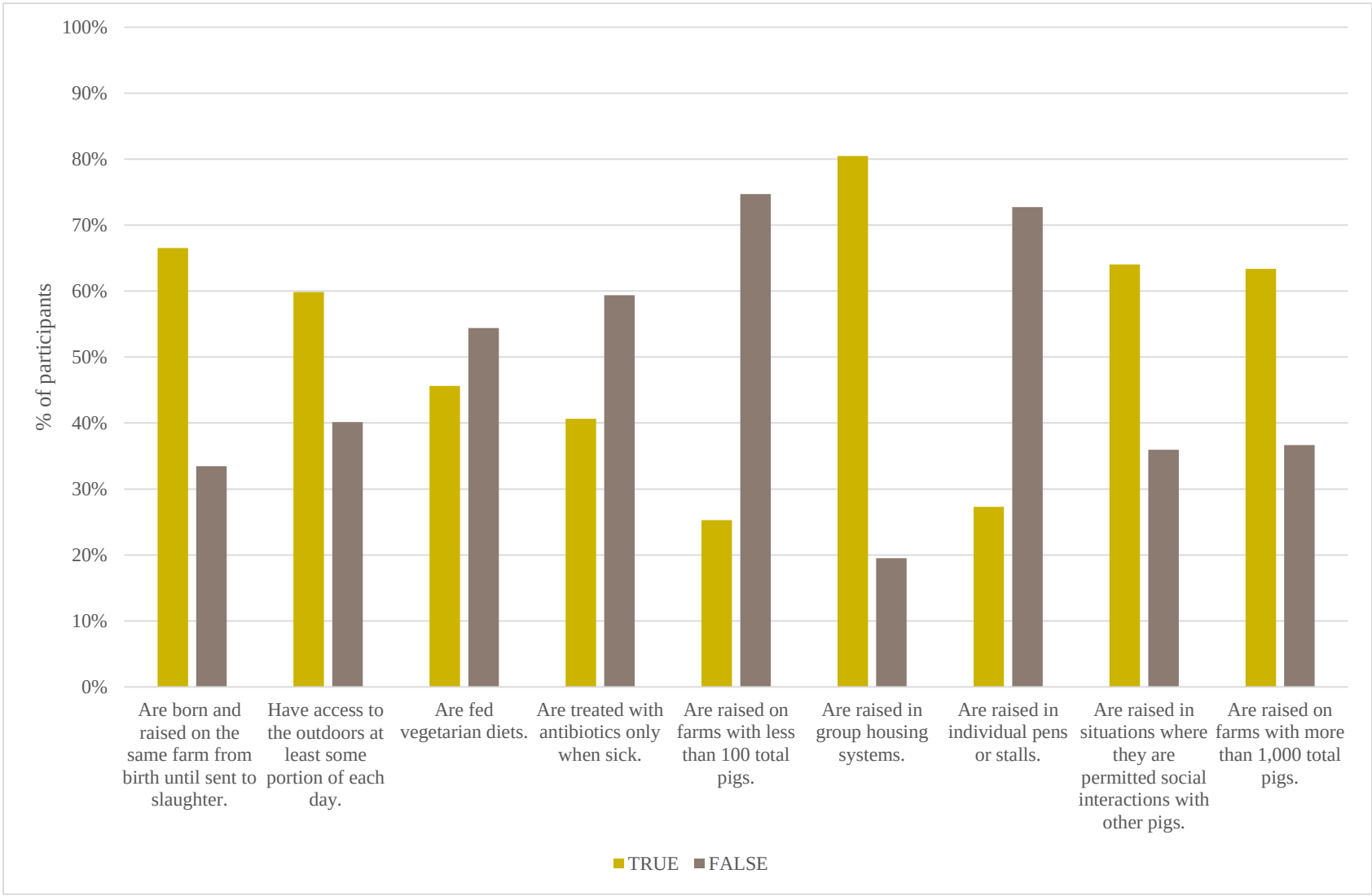


Figure 2.10 To the Best of My Knowledge the Majority of Pigs Raised for Pork in the United States (n=1004)

2.3.4 Views on Livestock Production and Growth

To identify United States consumer views on livestock production, the survey provided statements about animal agriculture growth and the respondents indicated on a scale their level of agreement with the statement provided. The scale was defined such that one was strongly disagree and seven was strongly agree. The results of these questions can be seen in Figure 2.11.

Most participants, 67%, indicated with some level of agreement that they believed the agriculture industry is important to their state of residence. The majority also indicated that they would not oppose the building or growth of livestock operations in their county. Most participants indicated with some level of agreement that they were supportive of the growth of livestock agriculture in their county. Thus, the majority of participants were generally friendly toward livestock operation growth. The majority of participants indicated they were neutral to the statement “I believe livestock operations make good neighbors”, and most strongly disagreed with the statement “I have experienced negative impacts from livestock operations near my home or work”. Approximately 30% of respondents agreed with the statement “I believe that livestock farms are environmentally harmful.”

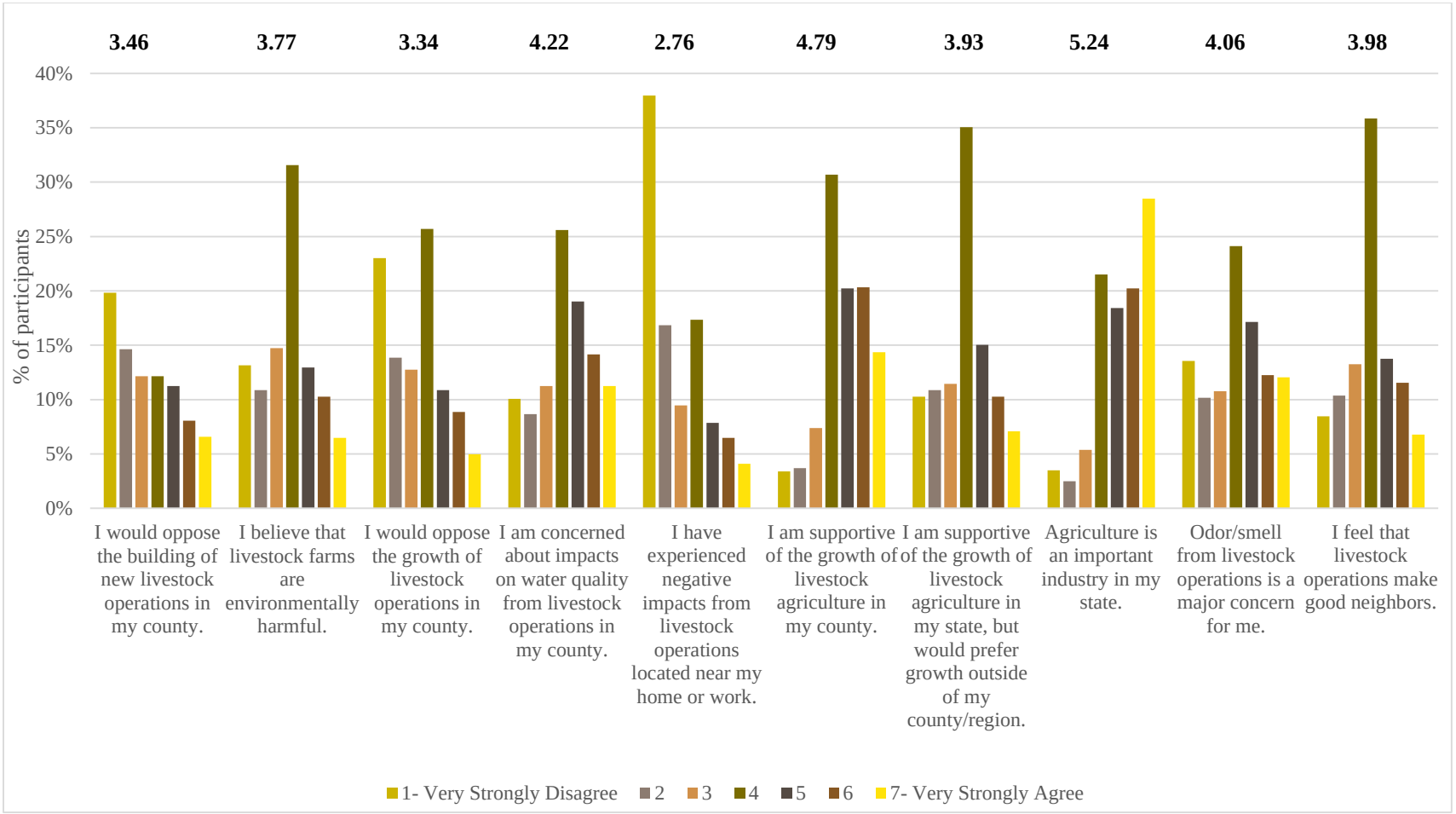


Figure 2.11 Consumer Perspective on Animal Agriculture Growth (n=1004)

2.3.5 Perceptions of Animal Welfare

When studying concerns for animal welfare in relation to consumption behavior it is useful to understand which practices consumers believe seriously reduce animal welfare. This particular analysis focuses on pork production practices and the concern for pig welfare. This survey asked participants to respond on a scale where one is very strongly disagree and seven was very strongly agree that the practices listed seriously reduce the welfare/humane treatment of pigs. Results can be found in figure 2.12.

The most common response for each practice listed was response “4”, which indicated neutrality. This response can be interpreted two different ways, either “respondent does not know” or “respondent has no strong feelings either way”. The mean response for the following practices was greater than four indicating that on average respondents felt these following practices seriously reduced pig welfare: confining hogs indoors, use of farrowing crates, use of gestation crates and housing sows in group pens. On the other hand, mean responses indicated participants on average did not perceive castration (neutering) of male pigs, ear notching for identification, and tail docking as seriously reducing the welfare/humane treatment of pigs. These findings are match the findings of McKendree and Widmar (2013) which hypothesizes that the potential reason people indicate less concern with castration, ear notching, tail docking and teeth clipping than the other practices is because the mentioned practices are common or known practices for household pets and that “respondents could also assume that pigs, like pets, are given analgesia or anesthesia during ear notching, castration, and tail docking” (McKendree and Widmar, 2013).

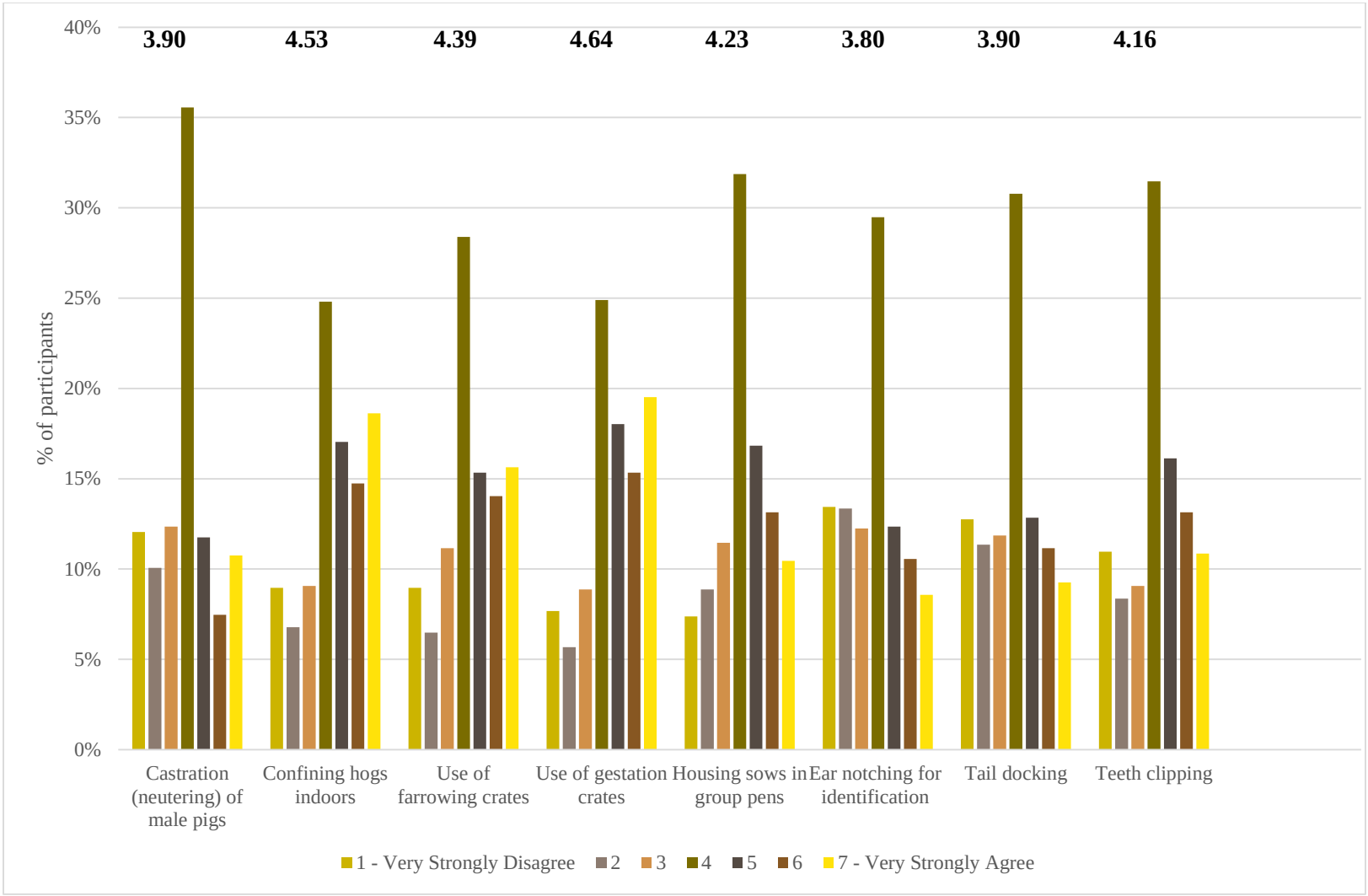


Figure 2.12 Consumers' Responses to "The Practices Seriously Reduce the Welfare/Humane Treatment of Pigs (n=1004)

This survey inquired about respondents' primary sources for animal welfare information (figure 2.13). According to McKendree, Croney, and Widmar (2014), "Understanding the primary sources of information that are used by the general public is key in understanding to whom consumers look for guidance on animal welfare issues." This survey found that the majority of participants, 54%, indicated that they had no source for animal welfare information. The top most selected primary sources were the Humane Society of the United States (HSUS), federal government agencies, agricultural producer groups/sources, and People for Ethical Treatment of Animals (PETA). McKendree, Croney, and Widmar (2014) found, in their nationally representative survey taken in 2012, the majority, 56% of respondents did not have a source, and of those who did, the most common source for animal welfare used was HSUS. Some differences between the findings of McKendree, Croney, and Widmar (2014) and this study include that there is a slightly larger percentage of respondents in this survey who indicated that their primary source was state government agencies (2% in the survey completed in 2012 compared with 4% in this survey). McKendree, Croney, and Widmar (2014) looked into relationships between the different sources and people's reported concern for animal welfare and found that the differences in levels of animal welfare concern were better correlated with having or not having a source, rather than which sources were used. (McKendree, Croney, and Widmar, 2014).

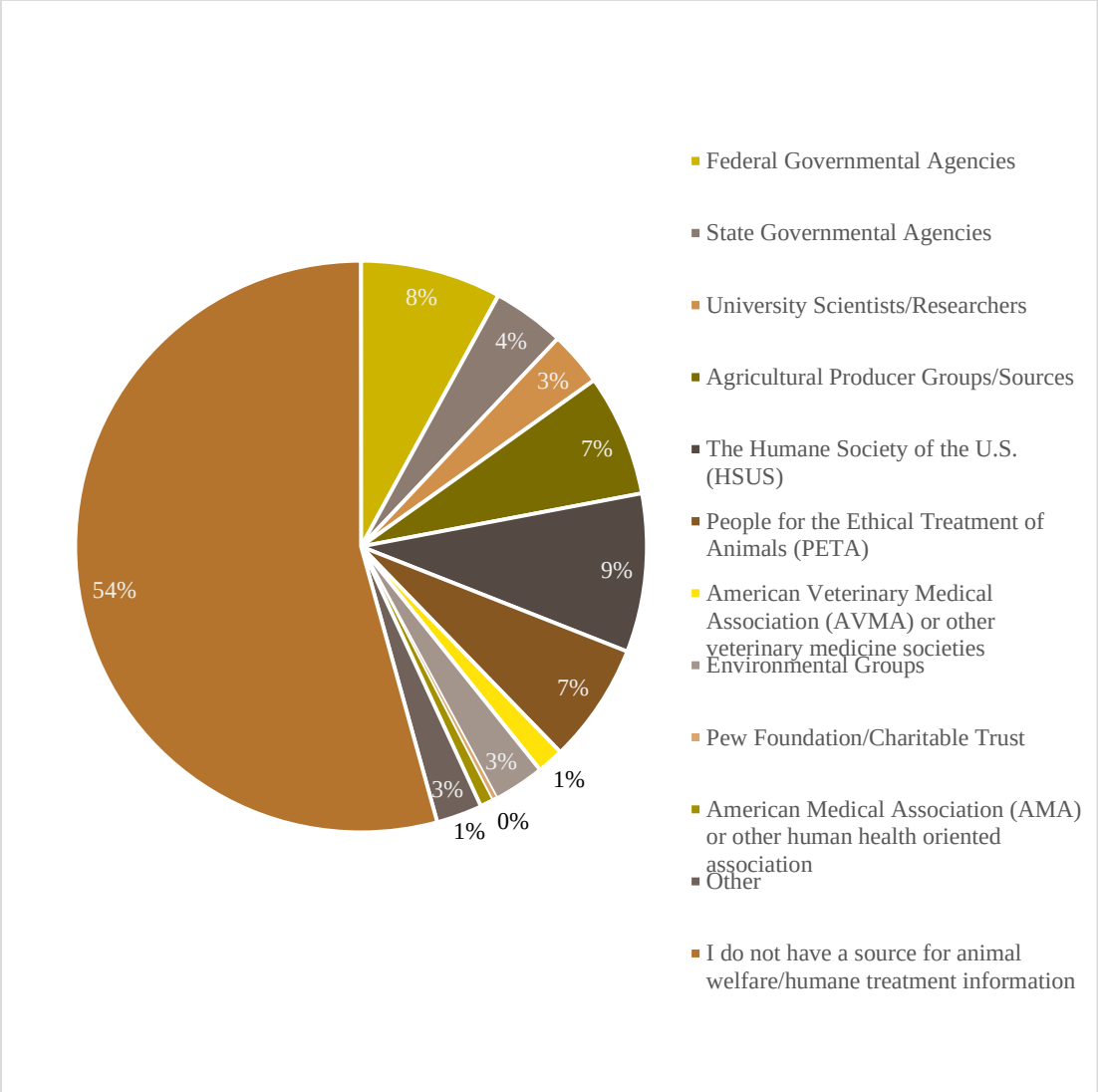


Figure 2.13 U.S. Consumers' Primary Source of Information for Animal Welfare (n=1004)

The survey asked participants to rate the ability different parties have to influence and ensure the proper animal welfare practices. These parties included; farmer/grower, meat or milk processor, retail grocer, food service restaurant, consumer- food purchaser, government inspectors/regulators/USDA, animal protection groups, and representative groups. Approximately 36% of participants indicated that the farmer/grower group had a very high ability to influence and ensure proper animal treatment practices, this was

larger than any other party in the supply chain. Other parties that participants perceived to have high ability to influence the treatment practices were government and meat or milk processors. Animal protection groups and representative groups also had the majority of people indicate that they felt they had some ability to influence animal treatment. The three parties that the majority of participants indicated they believed had low ability to influence were the retail grocers, food service restaurants, and food purchasers. A full presentation of the findings can be found in figure 2.14.

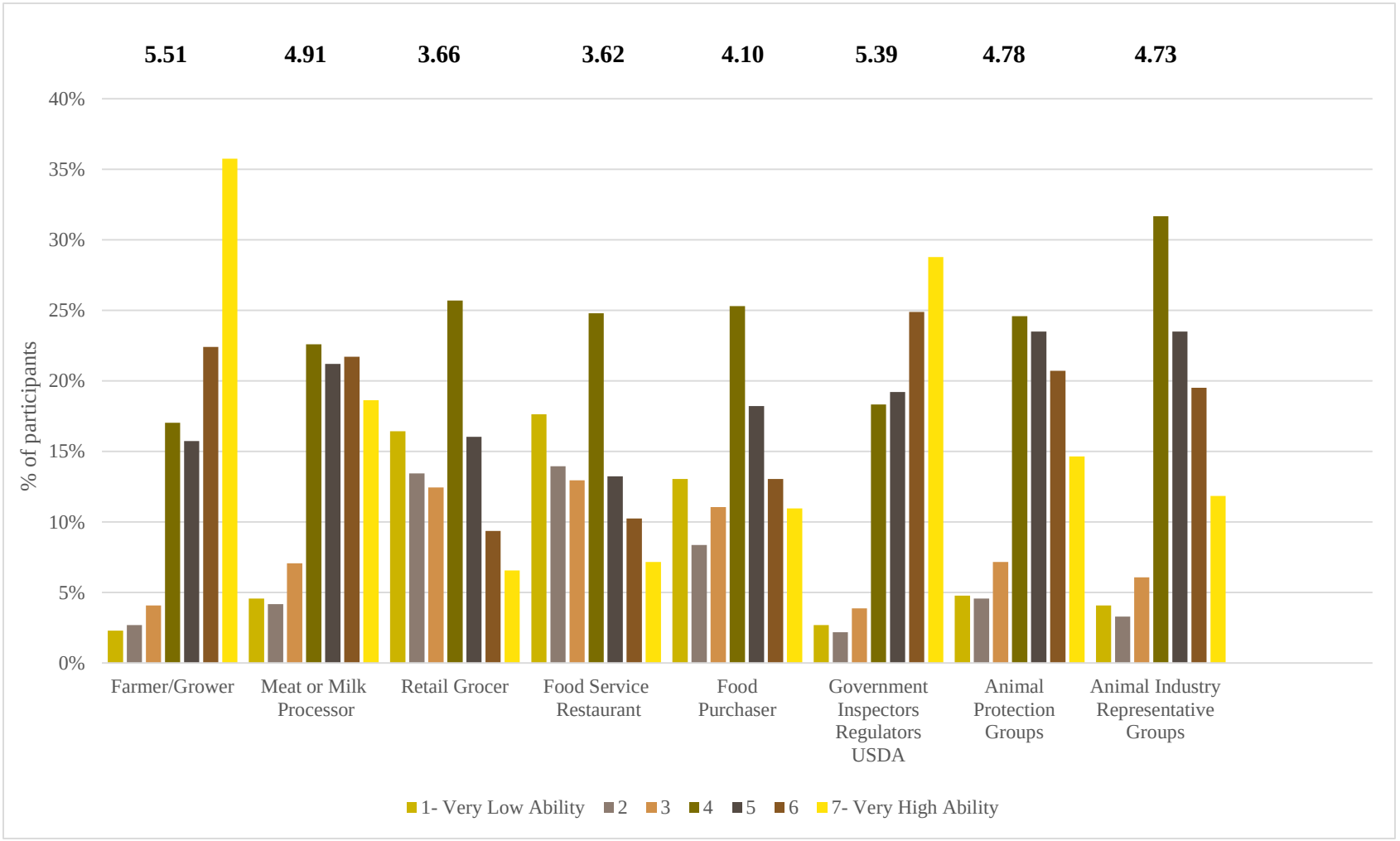


Figure 2.14 Perceptions of the Ability Each Party Has to Influence and Assure Proper Animal Welfare Treatment Practices (n=1004)

To understand how animal welfare concerns have impacted pork consumption, participants were asked if they had reduced their consumption of pork in the last three years due to concerns of animal welfare/humane treatment or handling concerns. Fifteen percent responded that they had reduced pork consumption due to animal welfare concerns in the past three years, of that group the mean reduction was 57 percent. These results are very similar to those of McKendree and Widmar (2013) who found in their United States representative survey that 14% of consumers reduced their pork consumption due to animal welfare concerns in the three years previous to their study. They found that on average those who reduced pork consumption did so by 56% (McKendree and Widmar, 2013).

2.3.6 Fair Oaks Farms (FOF)

This survey included elements that focused on the impacts of agritourism on perceptions of animal livestock production and animal welfare. In order to study this in relation to pork production, respondents were asked to indicate if they had heard of and/or had visited Fair Oaks Farms (FOF). Fifteen percent of respondents indicated that they heard of FOF and of those who had heard of FOF approximately 45% had visited. Thus, 7% of the total survey respondents had visited FOF. Of those who visited the majority, 69%, came with their family and 43% indicated they had visited multiple times.

Respondents who indicated they had either heard of or had been to FOF were asked additional questions regarding their experience and perspectives. Their responses to the rest of the survey were also compared between those who had heard of FOF and

those who had not to see if differences existed between these groups in demographics, household lifestyle, consumption behaviors, familiarity with animal agriculture, views on animal agriculture growth and views on animal welfare. Comparisons between those who had been to FOF and those who had not were completed using crosstabs and z-scores, conducted in SPSS. All findings referenced as being statistically significant are significant at the 5% level.

Participants who had heard of FOF were asked to share their perspectives of its credibility as a livestock operation. The majority of participants, 56%, stated that they felt the pigs were raised in average conditions. Of those who had heard of FOF, 38% stated that they believed the pigs raised at FOF are in above average conditions and 6% stated in below average conditions. Similarly, the majority, 54% of those who have heard of FOF, stated they believed the cows were raised in average conditions and 37% believing the cows were raised in above average conditions; the remaining 9% stated in below average conditions.

Participants were asked to indicate if they felt the practices employed at FOF with respect to environmental management and preservations were "above average", "average", or "below average". The majority, 54% selected average. There were 41% of respondents who selected above average, and 5% selected below average. The majority of participants who had heard of FOF believed that the welfare/humane treatment conditions under which pigs and dairy cows are raised at FOF was "good", with options "very poor", "poor", "fair", "good", and "excellent" to have chosen from.

2.3.6.1 Lifestyle Differences:

Demographic factors were compared and contrasted between respondents who had and those who had not heard of or been to FOF. Those who had heard of FOF or been to FOF tended to be 18-44 years old. Differences found include a larger percentage of those who had been to FOF had higher levels of income and higher levels of education compared with those who had not visited FOF.

A larger percentage of those who had been to FOF and or heard of FOF indicated that either they had a family member or relative who owns or operates a farm operation or that they owned and operated a farm operation.

2.3.6.2 Tourism Differences:

When examining the differences in tourism between those who had been to FOF and those who had not, a larger percentage of people who have been to FOF indicated that they have traveled more than 250 miles (round trip) from their home to go to an attraction of any kind. Also, a larger percentage of those who have been to FOF have also attended a higher percent of the other tourism attraction locations investigated compared with those who had not been to FOF, implying that those who attended FOF tend to be tourists. A larger percentage of those who had been to FOF had pets.

2.3.6.3 Consumption Differences:

A larger percentage of people who had been to FOF indicated that they had reduced pork consumption in the last 3 years due to animal welfare concerns as opposed to those who hadn't been of FOF. There was also a larger percent of those who had been to FOF who self-reported to be vegan and or self-reported to be vegetarians.

2.3.6.4 Familiarity with Animal Agriculture Differences:

A larger percentage of people who had been to FOF considered themselves to be highly educated about food. Also, we see that a larger percentage of those who had been to FOF identified themselves as educated about farming and agriculture in the United States.

When participants were asked to identify the most common size of pig farm in the United States a larger percentage of those who had been to FOF were incorrect. When participants were asked to identify the size of farm that most pigs raised for pork in the United States are raised on a larger percentage of those who had been to FOF were more correct about the most common size of farm that pigs in the United States are raised for pork

The series of true/false questions about the majority of pigs raised in the United States regarding farming practices exhibited differences in response between who had been versus those who had not been to FOF. The differences found are that a larger percentage of people who had been to FOF states that they believed the following statements were true: pigs are treated with antibiotics only when sick, pigs are raised on

farms with less than 100 total pigs, pigs are raised in individual pens or stalls. All of the other true/false statements investigated had no statistically different responses based on if the respondent had been to FOF or not.

2.3.6.5 Views on Animal Agriculture and Growth Differences:

For those who had been to FOF compared with those who had not, we see many differences in perspectives about animal agriculture and growth of operations. A larger percentage of those who had been to FOF agreed to all of the statements studied and listed below.

-I would oppose the building of new livestock operations in my county.

-I would oppose the growth of livestock operations in my county.

-I am concerned about impacts on water quality from livestock operations in my county.

-I have experienced negative impacts from livestock operations located near my home or work.

-I am supportive of the growth of livestock agriculture in my county.

-I am supportive of the growth of livestock agriculture in my state, but would prefer growth outside of my county/region.

-Agriculture is an important industry in my state.

-Odor/smell from livestock operations is a major concern for me.

-I feel that livestock operations make good neighbors.

2.3.6.6 Animal Welfare Perceptions Differences:

2.3.6.6.1 Practices:

Differences in animal welfare perceptions based on if respondents had been to FOF were examined. For those who had been to FOF versus those who had not, a larger percentage stated that they agreed that the use of castration (neutering) of male pigs, confining hogs indoors, use of farrowing crates, use of gestation crates, of housing sows in group pens, ear notching for identification, tail docking, and teeth clipping seriously reduced the animal welfare of pigs.

2.3.6.6.2 Sources of Animal Welfare Information:

When respondents were asked to identify their primary source of animal welfare information; a larger percentage of those who had been to FOF indicated they had a source for animal welfare information.

2.4 Conclusions and Impact

The majority of consumers indicated that they believe the agricultural industries are important to their state. They consider themselves to be educated about food, but less educated about agriculture. Fifty-four percent of participants indicated that they do not have a source for animal welfare information. While only a small percentage are directly

employed in the agricultural industry, 35% of respondents indicated that they are involved in some form of household food production in the last three years. Of those who participated in the survey, the largest group indicated that the primary reason to attend an agritourism location would be for education followed by obtaining food. The majority of participants are supportive of growth in the livestock industries and believe that agriculture is important in the state they reside. They are concerned with animal rearing practices surrounding the use of crates for pork production, and believe that of all the parties in the chain, the farmer has the highest ability to influence and assure proper treatment of animals in the production process.

CHAPTER 3. BEST-WORST ANALYSIS OF PORK ATTRIBUTES

3.1 Introduction

Consumers' concerns for the welfare and treatment of livestock animals continues to be a topic of conversation in different forms of media, academia, throughout the agriculture industry and food marketplace. A key focus for livestock producers, marketers, and economists alike is understanding consumer preference for pork production attributes. Consumers make purchasing decisions by making tradeoffs in pork attributes (consciously or subconsciously) in order to optimize utility.

This analysis examines how consumers make tradeoffs in pork attributes when making consumption choices by estimating consumer shares of preference for pork attributes. Additionally, this analysis investigates the relative importance of these attributes and the relationship between these values and consumer demographics, reported tourism activity, familiarity with pork production, and their views on animal agriculture and growth.

3.2 Data and Methods

3.2.1 Data

Three datasets are used for this analysis. The analysis is completed and reported separately for each of the samples. These surveys were designed and administered to mutually exclusive samples. The three samples varied based on sample location; national (1004 respondents), 5 state region (Indiana, Illinois, Iowa, Michigan, and Wisconsin with 1,029 respondents), and Indiana (797 respondents). All datasets were collected utilizing an online survey administered by Lightspeed GMI. Each sample was intended to be representative of age, gender, pre-tax income and region of residency for the geographic area included in the sample. In all three samples, respondents were required to be at least 18 years of age. The surveys were all administered on the same launch and close dates, July 23 through August 6, 2014.

Within each survey one question was designed to be a simple validation question. This question asked respondents to select the number six from numbers one through seven. Individuals who selected six were considered to have passed and all others were considered to have failed. According to Gao, House, and Bi (2012), “using validation question may be a good instrument to detect careless respondents in the survey and improve data quality.” Thus, the results discussion includes primarily results from the groups of participants who passed the validation question. It is noted when the whole sample or the passed validation sample is being presented.

Demographics of the survey respondents compared with the census statistics for age (U.S. Census Bureau, 2010 Census, Revised 2014), gender (U.S. Census Bureau, 2010 Census, Revised 2014), and income (U.S. Census Bureau, 2008-2012) are shown in table 3.1. Geographic differences and population by region of residency (U.S. Census Bureau, 2010-Census, Revised 2013) by survey sample are in table 3.2. Table 3.3 contains a recap of the sample size of respondents who passed the validation question by survey.

Table 3.1 Demographics of Survey Respondents

Variable Description	National Sample			5-State Sample		Indiana Sample	
	Survey (n=1004)	Passed Validation (n=857)	Census	Survey (n=1029)	Passed Validation (n=915)	Survey (n=797)	Passed Validation (n=701)
	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)
Female	50	50	51	54	54	56	57
Age							
18 to 24 years	8	7	13	7	6	4	4
25 to 44 years	39	37	35	36	34	33	32
45 to 64 years	36	37	35	38	40	43	44
65 years and over	17	19	17	19	20	20	20
Household Income							
Less than $25,000	22	20	23	25	24	21	19
$25,000-$34,999	11	12	11	11	11	12	13
$35,000 - $49,999	15	16	14	15	15	17	17
$50,000 - $74,999	20	20	18	19	20	22	23
$75,000 - $99,999	13	13	12	13	13	13	13
$100,000 - $149,999	13	14	13	13	13	11	11
$150,000 or more	6	5	9	4	4	4	4
Education							
Did not graduate from High School	2	1		2	1	2	2
Graduated from High School	18	17		20	20	21	20
Attended College, No Degree	22	22		22	23	24	24
Attended College, Associate or Trade Degree	14	15		13	13	13	13
Attended College, Bachelor's (B.S. or B.A.) Degree	29	28		27	27	24	25
Graduate or Advanced Degree (M.S., Ph.D., Law School)	15	17		15	15	15	15
Other	0	0		1	1	1	1
Political Affiliation							
Democratic Party	29	29		32	32	20	22
Republican Party	26	27		26	26	33	33
Independent	32	32		29	30	29	29
None of the above	13	12		13	12	18	16

Table 3.2 Geographic Demographics of Survey Respondents

Variable Description	National Sample Summary Statistics (n=857)		5-State Sample Summary Statistics (n=915)		Indiana Sample Summary Statistics (n=701)	
	Survey Frequency (%)	Census Frequency (%)	Survey Frequency (%)	Census Frequency (%)	Survey Frequency (%)	Census Frequency (%)
Northeast	18	18				
South	37	38				
Midwest	25	22				
West	20	22				
Illinois			27	28		
Indiana			14	14		
Michigan			21	21		
Ohio			24	25		
Wisconsin			14	12		
Region 1					14	15
Region 2					13	11
Region 3					14	13
Region 4					9	9
Region 5					21	17
Region 6					6	6
Region 7					4	4
Region 8					6	6
Region 9					4	6
Region 10					4	5
Region 11					5	8

Table 3.3 Recap of Test Question Results for all Three Samples

	National	5-State	Indiana
Passed	857	915	701
Percent Passed	85%	89%	88%
Failed	147	114	96
Total Sample	1004	1029	797

3.2.2 Methods

The method used for this analysis is the maximum difference scaling method, which is adapted from Lusk and Briggeman (2009) whom had adapted the most recent advances in this type of modeling. This analysis forces survey participants to make tradeoffs between pork attributes; animal welfare, price, pork food safety, taste, environmental impacts, locally raised/farmed pigs, and locally processed pork. These seven pork attributes were chosen because the span both product and production attributes that consumers may think and/or care about when they purchase pork products for consumption.

Respondents were asked to indicate which attribute in the block shown was the most important and the attribute that was the least important to them when they purchase pork. Every respondent saw the same set of seven blocks, where each block showed four attributes. Consumers were not allowed to select the same attribute in a block as both the most and least important. An example of the best-worst question can be seen in figure 1. The blocks were designed using a balanced incomplete block design which optimized frequencies and allowed for set of equal size.

From each of the following set of pork attributes, select the attribute that is most important to you when you purchase pork and the attribute that is the least important when you purchase pork:

Most Important		Least Important
□	Price	□
□	Locally processed pork	□
□	Pork/food safety	□
□	Environmental impacts	□

Figure 3.1 Best Worst Question Example

Following this set up $Z = 7$, where Z is the number of attributes, there are $Z(Z - 1) = 42$ best-worst combination possibilities each consumer could make. Given that consumers saw seven blocks with four attributes each, consumers had the opportunity to make twelve combinations per block leading to a total of 84 combination possibilities. The level of importance to participant y is $I_{yz} = \lambda_z + \varepsilon_{yz}$ where λ_z is the participant's y's latent, unobservable, level of importance of the attribute z, and ε_{yz} is the random error term. The probability of any one specific attribute chosen as "best" and any other chosen specific attribute as "worst" in the multinomial logit form is calculated following Lusk and Briggeman (2009), shown in equation (1) when ε_{yz} are *i.i.d.* type 1 extreme value.

$$Prob(\ z\ is\ chosen\ "best"\ and\ w\ chosen\ "worst") = \frac{e^{\lambda z + \lambda w}}{\sum_{l=1}^{Z}\sum_{m=1}^{Z} e^{\lambda l + \lambda m} - Z} \quad (1)$$

Then, using the maximum likelihood function the λ_z parameters are estimated based on the probability statement in equation (1). Within each task there are twelve possible pairs of most and least important that an individual could make. The dependent variable is defined such that the pair that is chosen by the individual is indicated with a one and the remaining unselected pairs are marked with a zero. The estimated λ_z is therefore the value of attribute z relative to the attribute that was normalized to zero in the estimation of the model.

Evidence of heterogeneity in consumer preferences exists in recent literature. The random parameters logit model (RPL) is regularly used to account for this type of heterogeneity. Following Lusk and Briggeman (2009) the RPL model is used in this analysis to examine consumers' preferences for pork production and product attributes. The RPL model makes modifications from the MNL form such that λ_z is then specified to

be different for each individual *y* and takes the form $\tilde{\lambda}_{yz} = \bar{\lambda}_z + \sigma_z \mu_{yz}$, with $\bar{\lambda}_z$ and σ_z as the population mean and standard deviation of λ_z, respectively. The term μ_{yz} is the random term that is distributed normally with zero as the mean. Following Train (2003) and Lusk and Briggman (2009) $\tilde{\lambda}_{yz} = \bar{\lambda}_z + \sigma_z \mu_{yz}$ is substituted into equation (1) and then the RPL is estimated by simulation using Halton draws for μ_{yz} in NLOGIT 5.0. This estimation by simulation seeks to maximize the simulated log-likelihood function.

The RPL model assumes that ε_{yz} is equal to one. The random error term, however, can vary between persons (Louviere, 2001) and thus it is possible that the mean of the parameter estimates of λ_z may be confounded with differences in scale. For this reason it is discouraged for one to interpret the RPL coefficient estimates, but rather to convert these estimates into shares of preference. Following Lusk and Briggeman (2009) shares of preference (S) are calculated for each attribute z are calculated using equations (2).

$$S_z = \frac{e^{\lambda z}}{\sum_{w=1}^{Z} e^{\lambda w}} \qquad (2)$$

The shares of preference for each of the seven attributes must sum to one, by design. For every sample, individual consumer-specific shares of preference for each of the seven attributes as well as the mean preference share for the entire dataset are estimated. “The results can be analyzed to reveal cardinal rankings and respondent characteristics associated with those rankings” (Wolf and Tonsor, 2013). Shares of preference estimated at the individual-specific level permits for the examination of correlations between these shares and consumers’ demographics, reported tourism activity, familiarity with pork production, and their views on animal agriculture and growth by consumer sample and individually done in SPSS.

3.3 Results and Discussions

3.3.1 Estimation of the Model Results

Results from the multinomial logit model (MNL) and RPL analysis are shown in table 3.4 through table 3.9. These were obtained using NLOGIT 5.0. Since the RPL results have standard deviations that are statistically significant, this confirms the existence of significant heterogeneity in respondents' preferences, and thus the results from the RPL with correlated errors analysis are of primary interest in this analysis. Since each individual coefficient is not meaningful on its own, the calculation of the shares of preferences (mean share of preference) for each attribute are also presented in tables 3.4-3.9. Both results of the full sample and the subset of each sample that passed the validation question are reported.

When investigating preference shares, the mean share for animal welfare was approximately 15% for each sample and ranked third in the National and 5-state surveys, and 4th in the Indiana survey. The rank of the different attributes from most important to least important for the National and 5-state samples are as follows: food safety, taste, animal welfare, price, environmental impact, locally raised pigs and locally processed pork. The state of Indiana sample (both when evaluating the whole sample and just those who passed the validation question) switched the rank of animal welfare and price in the order listed previously. A visualization of how the different samples varied from one another as well as between the whole sample and those who passed the validation question in each sample, is depicted in Figure 3.2.

Table 3.4 National Whole Sample MNL and RPL Results and Shares of Preference for Pork Attributes

	Econometric Estimates			**Shares of Preference**	
	MNL	**RPL**		**MNL**	**RPL**
		Coefficient	**Standard Deviation**		
Animal Welfare	0.9185*** (0.0326)	1.4711*** (0.0570)	1.4555*** (0.0557)	0.157	0.156
Price	0.7593** (0.0324)	0.9971*** (0.0727)	2.4569*** (0.0783)	0.134	0.097
Pork/Food Safety	1.5431*** (0.0344)	2.4303*** (0.0598)	1.4013*** (0.0609)	0.293	0.406
Taste	1.1699*** (0.0333)	1.7969*** (0.0534)	1.1923*** (0.0555)	0.202	0.215
Environmental Impacts	0.2964*** (0.0314)	0.3583*** (0.4891)	1.2010*** (0.0608)	0.084	0.051
Locally Raised/Farmed Pigs	0.0723** (0.0313)	0.0952** (0.0442)	0.9170*** (0.0601)	0.067	0.039
Locally Processed Pork	0.0000	0.0000		0.063	0.036

Note: Individuals made 7 choices and there were 1004 individuals, thus there were 7028 observations

***, **, * => Significance at 1%, 5%, 10% level.

Table 3.5. National Passed Sample MNL and RPL Results and Shares of Preference for Pork Attributes

	Econometric Estimates			**Shares of Preference**	
	MNL	**RPL**		**MNL**	**RPL**
		Coefficient	**Standard Deviation**		
Animal Welfare	1.0445*** (0.0360)	1.6596*** (0.0645)	1.5703*** (0.0632)	0.161	0.158
Price	0.8007*** (0.0356)	1.0554*** (0.0888)	2.6177*** (0.0907)	0.126	0.087
Pork/Food Safety	1.7045*** (0.0383)	2.6314*** (0.0681)	1.4507*** (0.0728)	0.311	0.418
Taste	1.2771*** (0.0368)	1.9963*** (0.0596)	1.1286*** (0.0621)	0.203	0.222
Environmental Impacts	0.3501*** (0.0343)	0.4893*** (0.0550)	1.2107*** (0.0624)	0.080	0.049
Locally Raised/Farmed Pigs	0.0893*** (0.0342)	0.1682*** (0.0498)	0.9766*** (0.0669)	0.062	0.036
Locally Processed Pork	0.0000	0.0000		0.057	0.030

Note: Individuals made 7 choices and there were 857 individuals, thus there were 5999 observations

***, **, * ==> Significance at 1%, 5%, 10% level.

Table 3.6 5 State Sample MNL and RPL Results and Shares of Preference for Pork Attributes

	Econometric Estimates			**Shares of Preference**	
	MNL	**RPL**		**MNL**	**RPL**
		Coefficient	**Standard Deviation**		
Animal Welfare	0.8543*** (0.0320)	1.3371*** (0.0601)	1.6479*** (0.0621)	0.152	0.137
Price	0.7965*** (0.0320)	1.2289*** (0.0810)	2.4985*** (0.0792)	0.143	0.123
Pork/Food Safety	1.4974*** (0.0338)	2.4185*** (0.0605)	1.5073*** (0.0727)	0.289	0.403
Taste	1.1396*** (0.0327)	1.7896*** (0.0554)	1.3233*** (0.0579)	0.202	0.215
Environmental Impacts	0.1659*** (0.0308)	0.1600*** (0.0496)	1.2287*** (0.0565)	0.076	0.042
Locally Raised/Farmed Pigs	0.1379*** (0.0307)	0.2161*** (0.0433)	0.8683*** (0.0628)	0.074	0.045
Locally Processed Pork	0.0000	0.0000		0.065	0.036

Note: Individuals made 7 choices and there were 1029 individuals, thus there were 7203 observations

***, **, * ==> Significance at 1%, 5%, 10% level.

Table 3.7 5 State Passed Sample MNL and RPL Results and Shares of Preference for Pork Attributes

	Econometric Estimates			**Shares of Preference**	
	MNL	**RPL**		**MNL**	**RPL**
		Coefficient	**Standard Deviation**		
Animal Welfare	0.9356*** (0.0344)	1.5476*** (0.0660)	1.7187*** (0.0683)	0.155	0.145
Price	0.8251*** (0.0343)	1.3755*** (0.0861)	2.8566*** (0.0930)	0.139	0.122
Pork/Food Safety	1.5940*** (0.0365)	2.5600*** (0.0663)	1.5298*** (0.0730)	0.300	0.400
Taste	1.1989*** (0.0352)	1.9707*** (0.0614)	1.3903*** (0.0628)	0.202	0.222
Environmental Impacts	0.1725*** (0.0329)	0.2341*** (0.0527)	1.2316*** (0.0639)	0.072	0.039
Locally Raised/Farmed Pigs	0.1333*** (0.0328)	0.2421*** (0.0486)	0.9568*** (0.0622)	0.070	0.039
Locally Processed Pork	0.0000	0.0000		0.061	0.031

Note: Individuals made 7 choices and there were 915 individuals, thus there were 6405 observations

***, **, * ==> Significance at 1%, 5%, 10% level

Table 3.8 Indiana Whole Sample MNL and RPL Results and Shares of Preference for Pork Attributes

	Econometric Estimates			**Shares of Preference**	
	MNL	**RPL**		**MNL**	**RPL**
		Coefficient	**Standard Deviation**		
Animal Welfare	0.8558*** (0.0371)	1.4935*** (0.0736)	1.8502*** (0.0723)	0.132	0.124
Price	1.0708*** (0.0376)	1.6287*** (0.1010)	2.7018*** (0.0953)	0.164	0.142
Pork/Food Safety	1.6751*** (0.0397)	2.6332*** (0.0677)	1.2770*** (0.0784)	0.299	0.389
Taste	1.3286*** (0.0384)	2.1520*** (0.0643)	1.1754*** (0.0673)	0.212	0.240
Environmental Impacts	0.2618*** (0.0356)	0.3316*** (0.0591)	1.4425*** (0.0692)	0.073	0.039
Locally Raised/Farmed Pigs	0.1473*** (0.0354)	0.2683*** (0.0517)	0.9953*** (0.0803)	0.065	0.037
Locally Processed Pork	0.0000	0.0000		0.056	0.028

Note: Individuals made 7 choices and there were 797 individuals, thus there were 5579 observations

***, **, * ==> Significance at 1%, 5%, 10% level.

Table 3.9 Indiana Passed Sample MNL and RPL Results and Shares of Preference for Pork Attributes

	Econometric Estimates			Shares of Preference	
	MNL	RPL		MNL	RPL
		Coefficient	Standard Deviation		
Animal Welfare	0.9186*** (0.0400)	1.6206*** (0.0814)	1.9026*** (0.0746)	0.135	0.119
Price	1.0908*** (0.0404)	1.6644*** (0.1013)	2.8260*** (0.0967)	0.160	0.124
Pork/Food Safety	1.7354*** (0.0428)	2.9246*** (0.0778)	1.4591*** (0.0760)	0.305	0.439
Taste	1.3696*** (0.0413)	2.2651*** (0.0712)	1.3271*** (0.0708)	0.212	0.227
Environmental Impacts	0.2863*** (0.0381)	0.3956*** (0.0638)	1.4315*** (0.0738)	0.072	0.035
Locally Raised/Farmed Pigs	0.1605*** (0.0379)	0.3247*** (0.0581)	1.1310*** (0.0755)	0.063	0.033
Locally Processed Pork	0.0000	0.0000		0.054	0.024

Note: Individuals made 7 choices and there were 701 individuals, thus there were 4907 observations

***, **, * ==> Significance at 1%, 5%, 10% level.

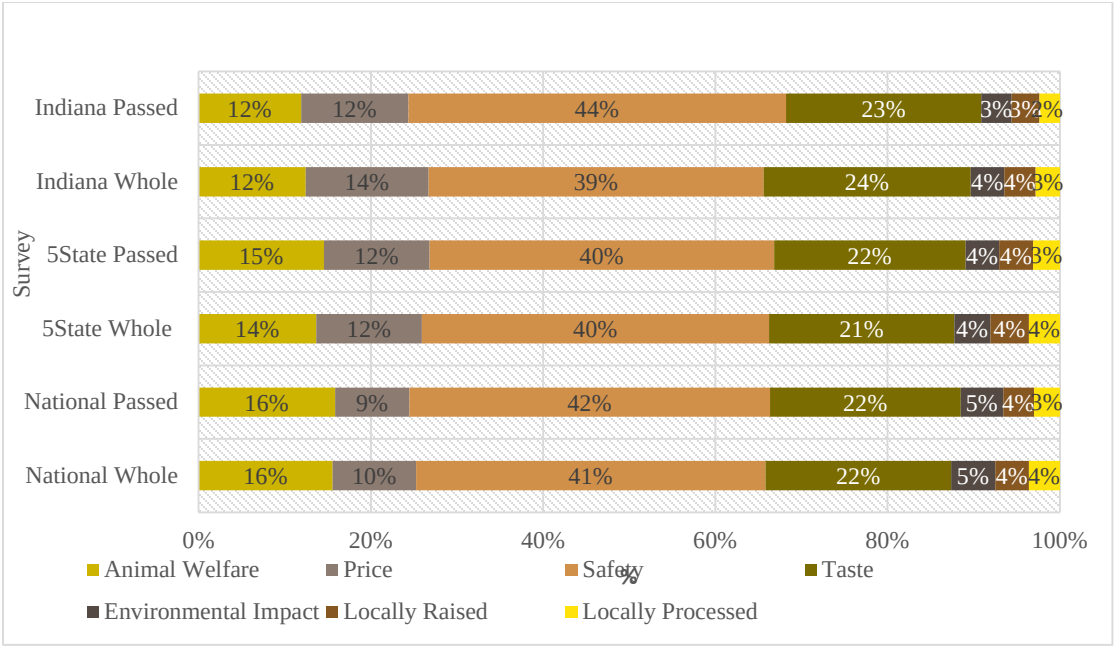


Figure 3.2 Mean Preference Share by Sample

3.3.2 Individual Shares of Preference Correlation Results

This section of results examines correlations between individual-specific preference shares for each of the seven attributes in the subset of the sample that passed the validation question. Results of the correlations between shares of preference size for each of the attributes is shown in tables 3.10-12. The preference share for animal welfare was negatively correlated with the size of the share of preference attributes price, safety, and taste; meanwhile it is positively correlated with the size of the share of preference for environmental impact, locally raised/farmed pigs and locally processed pork in all three samples. Also, respondents who had a larger share of preference for animal welfare (implying they have more concern for animal welfare, relative to the other attributes studied, when making their purchasing decision) had ranked the pork product attributes of price, safety and taste as less important relative to the other attributes. Price is negatively correlated with all other attributes at the 1% significant level. This result is interesting because it implies that participants who selected price as more important tended to rank all other attributes as less important, and similarly participants who ranked price as less important tended to rank all other attributes as more important, ultimately implying that consumers may have in their mind a tradeoff between price and all other attributes.

Table 3.10 Correlations of Shares of Preference for Pork Attributes- National (Passed Validation) Sample (n=857)

	Animal Welfare	Price	Pork/ Food Safety	Taste	Environmental Impacts	Locally Raised/ Farmed Pigs	Locally Processed Pork
Animal Welfare	1	-.406**	-.289**	-.232**	.132**	.083*	.089**
Price	-.406**	1	-.512**	-.181**	-.238**	-.231**	-.326**
Pork/Food Safety	-.289**	-.512**	1	-.259**	-.118**	-.151**	-.145**
Taste	-.232**	-.181**	-.259**	1	-.003	.088**	.259**
Environmental Impacts	.132**	-.238**	-.118**	-.003	1	.232**	.370**
Locally Raised/Farmed Pigs	.083*	-.231**	-.151**	.088**	.232**	1	.669**
Locally Processed Pork	.089**	-.326**	-.145**	.259**	.370**	.669**	1

Note: Statistical significance (2-tailed) at the 5% and 1% level is represented by * and ** respectively

Table 3.11 Correlations of Shares of Preference for Pork Attributes- 5 State (Passed Validation) Sample (n=915)

	Animal Welfare	Price	Pork/ Food Safety	Taste	Environmental Impacts	Locally Raised/ Farmed Pigs	Locally Processed Pork
Animal Welfare	1	-.416**	-.251**	-.261**	.153**	.084*	.133**
Price	-.416**	1	-.519**	-.230**	-.281**	-.247**	-.359**
Pork/Food Safety	-.251**	-.519**	1	-.207**	-.039	-.117**	-.080*
Taste	-.261**	-.230**	-.207**	1	-.044	.045	.146**
Environmental Impacts	.153**	-.281**	-.039	-.044	1	.254**	.438**
Locally Raised/Farmed Pigs	.084*	-.247**	-.117**	.045	.254**	1	.643**
Locally Processed Pork	.133**	-.359**	-.080*	.146**	.438**	.643**	1

Note: Statistical significance (2-tailed) at the 5% and 1% level is represented by * and ** respectively

Table 3.12 Correlations of Shares of Preference for Pork Attributes- Indiana (Passed Validation) Sample (n=701)

	Animal Welfare	Price	Pork/ Food Safety	Taste	Environmental Impacts	Locally Raised/ Farmed Pigs	Locally Processed Pork
Animal Welfare	1	-.416**	-.251**	-.261**	.153**	.084*	.133**
Price	-.416**	1	-.519**	-.230**	-.281**	-.247**	-.359**
Pork/Food Safety	-.251**	-.519**	1	-.207**	-.039	-.117**	-.080*
Taste	-.261**	-.230**	-.207**	1	-.044	.045	.146**
Environmental Impacts	.153**	-.281**	-.039	-.044	1	.254**	.438**
Locally Raised/Farmed Pigs	.084*	-.247**	-.117**	.045	.254**	1	.643**
Locally Processed Pork	.133**	-.359**	-.080*	.146**	.438**	.643**	1

Note: Statistical significance (2-tailed) at the 5% and 1% level is represented by * and ** respectively

3.3.3 Shares of Preference Correlated with Demographics

The results from correlations between consumer demographics and relationships to the shares of preference for each of the attributes can be seen in table 3.13, 3.14, and 3.15 for National, 5-state, and Indiana samples respectively. In the national sample, the gender male was negatively correlated with the size of the share of preference for the attribute animal welfare and positive correlation with the size of the share of preference for the attributes taste and locally processed pork. Being a person in the age category of 25-44 years was correlated with larger shares of preference for the attributes animal welfare, environmental impacts, locally raised, and locally processed, and correlated with having smaller shares of preference for the attribute pork food safety. Individuals reporting higher income levels had income correlated with larger shares of preferences for the pork attributes of animal welfare, taste, environmental impacts, locally raised and processed and negative correlations with the attribute price.

Respondents who reported having at least a college education had education positively correlated with the size of the shares of preference for attributes taste and environmental impacts. Respondents who self-identify as affiliated with the Republican Party had political affiliation negative correlations with the size of the share of preference for the attributes animal welfare and environmental impacts, and positive correlations to the size of the share of preference for the attribute pork food safety.

Table 3.16 displays correlations between attributes shares of preference and consumers region of residence for all three samples. There are very few statistically significant correlations based on region of residence. However, in the national sample residence of the south region had region of residency negatively correlated with the size of the share of preference for locally processed pork. Residents of the west region had region of residency positively correlated with the size of the share of preference for animal welfare.

Table 3.13 Pearson Correlations between Attributes and Demographics-National (Passed Validation) Sample (n= 857)

	Animal Welfare	Price	Pork/ Food Safety	Taste	Environmental Impacts	Locally Raised/ Farmed Pigs	Locally Processed Pork
Male	-.169**	.062	-.030	.141**	.022	.029	.089**
Age							
18- 24 years	.034	-.064	.008	.035	.040	.011	.007
25- 44 years	.092**	-.038	-.083*	-.003	.105**	.109**	.140**
45-64 years	-.082*	.081*	.014	.024	-.127**	-.083*	-.106**
65 years and over	-.034	-.011	.079*	-.048	.001	-.040	-.046
Income	-.090**	-.083*	.042	.120**	.085*	.104**	.158**
College Educated	-.045	-.005	-.033	.069*	.104**	.048	.059
Political Affiliation							
Democratic Party	.050	-.014	-.021	-.015	.026	-.015	.022
Republican Party	-.124**	.011	.091**	.030	-.085*	.003	-.064
Independent	.056	-.038	-.045	.027	.083*	.009	.065
None of the Above Political Affiliation	.020	.058	-.032	-.060	-.038	.003	-.036

Note: Statistical significance (2-tailed) at the 5% and 1% level is represented by * and ** respectively

Table 3.14 Sample Pearson Correlations between Attributes and Demographics- 5-State (Passed Validation) Sample (n=915)

	Animal Welfare	Price	Pork/ Food Safety	Taste	Environmental Impacts	Locally Raised/Farmed Pigs	Locally Processed Pork
Male	-.189**	.068*	-.032	.168**	.029	-.020	-.010
Age							
18- 24 years	.044	.009	-.066*	.001	.057	.010	.072*
25- 44 years	.001	-.052	.000	.008	.110**	.121**	.121**
45-64 years	-.006	.057	-.044	.020	-.074*	-.050	-.102**
65 years and over	-.021	-.013	.095**	-.036	-.075*	-.087**	-.063
Income	-.037	-.130**	.099**	.080*	.047	.073*	.080*
College Educated	-.059	-.011	.057	-.012	.073*	.005	.018
Political Affiliation							
Democratic Party	.063	-.026	-.028	-.032	.131**	-.002	.046
Republican Party	-.080*	.009	.043	.064	-.115**	-.030	-.017
Independent	.030	-.024	-.032	.027	-.002	.071*	.006
None of the Above Political Affiliation	-.025	.059	.026	-.077*	-.030	-.056	-.051

Note: Statistical significance (2-tailed) at the 5% and 1% level is represented by * and ** respectively.

Table 3.15 Pearson Correlations between Attributes and Demographics- Indiana (Passed Validation) Sample (n=701)

	Animal Welfare	Price	Pork/ Food Safety	Taste	Environmental Impacts	Locally Raised/Farmed Pigs	Locally Processed Pork
Male	-.111**	.119**	-.118**	.108**	.005	-.017	-.043
Age							
18- 24 years	.038	.007	-.026	-.028	.030	-.017	.019
25- 44 years	-.020	.073	-.084*	.026	-.013	-.016	.007
45-64 years	.037	-.081*	.087*	-.035	-.010	.032	-.008
65 years and over	-.041	.012	.003	.026	.014	-.014	-.008
Income	-.059	-.078*	.027	.140**	.006	.087*	.092*
College Educated	-.083*	.077*	-.013	-.020	.059	-.031	-.036
Political Affiliation							
Democratic Party	.074*	-.067	.004	-.045	.139**	.028	.114**
Republican Party	-.137**	.064	.042	.045	-.125**	-.001	-.049
Independent	.074*	-.018	-.041	.024	-.039	-.040	-.071
None of the Above Political Affiliation	.000	.015	-.009	-.037	.052	.019	.022

Note: Statistical significance (2-tailed) at the 5% and 1% level is represented by * and ** respectively.

Table 3.16 Pearson Correlations between Attributes and Region of Residence for Passed Validation Samples

	Animal Welfare	Price	Pork/ Food Safety	Taste	Environmental Impacts	Locally Raised/Farmed Pigs	Locally Processed Pork
National Sample (n=857)							
Midwest	-.025	.042	-.052	.041	.010	-.002	.015
South	-.032	.014	.015	.020	-.012	-.042	-.081*
West	.073*	-.033	.017	-.064	-.026	.005	.022
Northeast	-.007	-.030	.022	-.005	.031	.049	.061
5 State Sample (n=915)							
Illinois	-.012	.019	-.004	.022	.004	-.092**	-.059
Indiana	.108**	-.053	.019	-.069*	.040	-.031	-.036
Michigan	.028	-.015	-.033	.026	-.002	.033	.036
Ohio	-.084*	.035	.036	-.025	-.004	.053	.042
Wisconsin	-.023	.006	-.020	.042	-.038	.047	.017
Indiana Sample (n=701)							
Region1	-.001	.043	-.054	.020	-.015	-.036	-.024
Region2	-.010	.027	.025	-.065	-.027	.014	-.002
Region3	-.030	.000	-.037	.057	.041	.065	.046
Region4	.022	.000	.033	-.039	-.046	-.065	-.057
Region5	-.016	.027	-.025	.012	.006	-.018	-.008
Region6	.013	-.052	.008	.055	.026	-.007	.008
Region7	.039	-.011	-.013	.005	-.013	-.034	-.019
Region8	.003	-.075*	.065	-.004	.025	.100**	.060
Region9	.074	.004	-.027	-.055	-.027	.013	-.005
Region10	-.038	.009	.035	.010	-.043	-.045	-.017
Region11	-.014	-.020	.028	-.013	.067	.006	.018

Note: Statistical significance (2-tailed) at the 5% and 1% level is represented by * and ** respectively.

The national sample had 4% of respondent's indicate they were vegetarian and 2% of respondents self-reported to be vegan. The five state sample had 3% vegetarian and 2% of respondents were vegan, meanwhile Indiana sample had 2% of respondent were vegetarian and 0.5% were vegan. Respondents were also asked to indicate if that

had someone in their household (other than themselves) that was a vegetarian or vegan. Results are shown in table 3.17. According to Vegetarian Times (2008), the national vegetarian rate was 3.2% vegetarian and 0.5% vegan.

Table 3.17 Vegan and Vegetarian Rates by Sample

	National Sample (n=1004)	5-State Sample (n=1029)	Indiana Sample (n=797)
I am a vegetarian	4%	3%	2%
Someone in my household (other than myself) is a vegetarian	5%	3%	2%
No one is a vegetarian in my household	92%	95%	97%
I am a vegan	2%	2%	0.5%
Someone in my household (other than myself) is a vegan	3%	1%	0.5%
No one in my house is a vegan	95%	97%	99%

Correlations between those individuals who identified themselves as vegetarian or as vegan and the preference shares between attributes results are in table 3.18. Results show that, in the national sample, indicating oneself as vegetarian or vegan was correlated with having larger preference shares for the attribute animal welfare.

Table 3.18 Pearson Correlations between Attributes and Vegetarian and Vegan

	Animal Welfare	Price	Pork/ Food Safety	Taste	Environmental Impacts	Locally Raised/Farmed Pigs	Locally Processed Pork
National Sample- Passed Validation (n=857)							
I am a vegetarian	.088*	-.024	-.051	-.036	.086*	.034	.064
Someone in my household (other than myself) is a vegetarian	.050	-.093**	-.004	.016	.095**	.115**	.172**
No one is a vegetarian in my household	-.100**	.083*	.048	.006	-.136**	-.110**	-.175**
I am a vegan	.074*	-.066	-.016	-.027	.035	.147**	.129**
Someone in my household (other than myself) is a vegan	.020	-.035	-.054	.042	.118**	.095**	.125**
No one in my house is a vegan	-.069*	.059	.057	-.014	-.112**	-.126**	-.164**
5 State Sample- Passed Validation (n=915)							
I am a vegetarian	.131**	-.042	-.058	-.088**	.175**	.059	.148**
Someone in my household (other than myself) is a vegetarian	.108**	-.056	.008	-.050	.021	-.026	-.009
No one is a vegetarian in my household	-.144**	.060	.019	.100**	-.127**	-.026	-.099**
I am a vegan	.054	-.050	-.018	-.040	.184**	.060	.165**
Someone in my household (other than myself) is a vegan	.010	-.003	.006	-.036	.021	.025	.062
No one in my house is a vegan	-.055	.031	.029	.048	-.154**	-.062	-.148**
Indiana Sample- Passed Validation (n=701)							
I am a vegetarian	.164**	-.068	-.056	-.073	.098**	.090*	.129**
Someone in my household (other than myself) is a vegetarian	.049	-.069	-.001	.027	.041	.054	.076*
No one is a vegetarian in my household	-.161**	.111**	.039	.027	-.104**	-.111**	-.150**
I am a vegan	.043	-.045	-.013	-.008	.055	.093*	.105**
Someone in my household (other than myself) is a vegan	.007	-.035	.018	-.023	.067	.076*	.093*
No one in my house is a vegan	-.036	.056	-.004	.022	-.086*	-.120**	-.140**

Note: Statistical significance (2-tailed) at the 5% and 1% level is represented by * and ** respectively.

A recent study (McKendree and Widmar, 2013) hypothesized that pet ownership (or relations to or interactions with animals of any species) had the potential to influence people's perceptions of livestock animal welfare. Given the hypothesized linkage between pet ownership and stronger preferences for animal welfare, this analysis

correlated the shares of preference for the different attributes (including animal welfare) with pet ownership. In McKendree and Widmar (2013) they found 48% of households owned a dog and 40% of households owned a cat. Similarly, this study's national sample 40% owned cats and 46% owned dogs. The 5-state 39% of respondents owned a cat and 47% owned a dog. The Indiana sample had 38% of respondents own a cat and 48% owned a dog. The results of the correlations between pet ownership and size of the share of preference for the pork attributes are displayed in table 3.19. The results also support the idea of a linkage between pet ownership and concern for animal welfare. As seen in table 3.19, indicating ownership of a cat and or indicating ownership of a dog was positively correlated with the size of the share of preference for the attribute animal welfare.

Table 3.19 Pearson Correlations between Attributes and Pet Ownership

	Animal Welfare	Price	Pork/ Food Safety	Taste	Environmental Impacts	Locally Raised/Farmed Pigs	Locally Processed Pork
National Sample- Passed Validation (n=857)							
Owns a dog	.070*	-.076*	-.001	-.020	.044	.111**	.118**
Owns a cat	.116**	-.059	-.064	-.026	.063	.153**	.107**
5 State Sample- Passed Validation (n=915)							
Owns a dog	.142**	-.041	-.050	-.071*	.035	.067*	.061
Owns a cat	.169**	-.072*	-.061	-.031	.047	.034	.071*
Indiana Sample- Passed Validation (n=701)							
Owns a dog	.113**	-.010	-.073	-.013	-.031	.005	.031
Owns a cat	.115**	-.025	-.031	-.094*	.076*	.041	.033

Note: Statistical significance (2-tailed) at the 5% and 1% level is represented by * and ** respectively.

3.3.4 Household Lifestyle

This section examines preference share size for the different pork attributes correlated with participant's household life style. This specifically looks at participants who have familial ties to a farm operation, produce food for household consumption, and/or consumers who visit tourism locations. The results for all household lifestyle correlations are in tables 3.20, 3.21, and 3.22 for National, 5-state and Indiana samples, respectively.

The survey asked respondents, "Do you, a family member or relative own or operate a farm business in any capacity (including a partnership or part-owner). The respondents then selected all options that applied from the list:

- ☐ Yes, I own or operate a farm business
- ☐ Yes, I have a family member or relative who owns or operates a farm business
- ☐ No

Respondents who selected "no" had statistically significant negative correlations with the size of the share of preference for pork attributes environmental impacts (national sample only), locally raised/farmed pigs, and locally processed pork implying that those who had no familial ties to a farm operation and/or ownership tended to have smaller preference shares for the attributes mentioned.

The survey asked participants to identify which household production practices their household participated in within the last three years. The set of options participants were presented with (and asked to select all that applied) was: cultivating fruit trees and/or berries, growing produce of any kind in a personal garden at home, growing produce of any kind in a personal garden not at home, raising chicken primarily for eggs,

raising chicken primarily for meat, and raising animals (other than chickens) for meat or milk).

Participants in the national sample who indicated that their household participated in any of the production practices had statistically significant negative correlations with the size of the share of preference for pork attributes price, and positive correlations with the size of share of preference for the pork attributes locally raised/farmed pigs and locally processed pork. Indicating no involvement in any of the production processes in the past three years was positively correlated with the size of preference share for price and negative correlations with the size of preference share for the attributes locally raised/farmed pigs and locally processed pork. Indicating involvement in any of the production processes other than a personal garden at home was positively correlated with share of preference size for attribute environmental impacts. Other than those who have a home garden, participants whose households participated in the production processes listed tended to have indicated environmental impacts was more important in pork attributes than those who had not participated in the household production practices.

Correlations between the size of preference share for pork attributes and individuals who had attended tourism locations were analyzed in order to better understand participants who had visited tourism locations, specifically those who visited agritourism locations versus those who visited other tourism locations and those who have not attended tourism locations. Participants in the national survey who had visited an animal shelter or rescue organization were correlated with having a larger share of preference for the attribute animal welfare. Of all the tourism locations investigated, animal shelter/rescue organization was the only location category that had statistically

significant correlations with the size of the share of preference for the attribute animal welfare.

Perhaps of most interest for this study is those who have attended dairy farms, pig farms and horse farms. Results show that those who have attended any of these locations have statistically significant positively correlated preference shares for locally raised/farmed pigs and locally processed pork. Also, those who had been to dairy farms and those who had been to pig farms had statistically significant positive correlations to the size of preference shares for environmental impact.

Respondents who passed the validation test in the national sample and indicated they had visited a dairy farm, pig farm or horse farm in the past ten years were grouped into one group (called “visited livestock operation”) and analyzed. Those who had visited a livestock operation had positive correlations with the size of the share of preference for animal welfare and environmental impacts (findings are statistically significant for spearman correlations at the 10% level). Those who had visited a livestock operation in the past ten years had negative correlations with the size of the share of preference for locally raised/farmed pigs and locally processed pork (findings statistically significant for spearman correlations at the 1% level). These results, at minimum, challenge the hypothesis by some in the agriculture industry that by bringing consumers to a farm they will be less concerned about animal welfare/humane treatment. Further examination of this hypothesis is necessary. These results suggest that people who visited livestock operations may in general believe welfare of pigs to be more important or of more concern than those who have not visited.

Table 3.20 Correlations between Attributes and Household Lifestyle: National (Passed Validation) Sample (n=857)

	Animal Welfare	Price	Pork/Food Safety	Taste	Environmental Impacts	Locally Raised/Farmed Pigs	Locally Processed Pork
Respondent, a family member or relative do NOT own or operate a farm business in any capacity, including a partnership or part-owner)	-.024	.056	.044	-.029	-.126**	-.161**	-.169**
Household Production (In the last three years)							
Cultivating fruit trees and/or berries	.021	-.080*	.022	-.002	.072*	.129**	.135**
Growing produce of any kind in a personal garden at home.	.011	-.069*	.014	.033	.023	.099**	.111**
Growing produce of any kind in a personal garden not at home (in a garden plot or community garden)	.043	-.097**	-.011	-.003	.135**	.220**	.207**
Raising chickens primarily for eggs	.031	-.082*	-.066	.076*	.158**	.174**	.280**
Raising chickens primarily for meat	.038	-.091**	-.028	.022	.171**	.182**	.186**
Raising animals (other than chickens) for meat or milk	.059	-.117**	.017	.023	.079*	.104**	.156**
None of the above household production	-.017	.079*	-.009	-.037	-.045	-.118**	-.139**
Ever Visited one of the following tourism locations							
Pumpkin Patch	.004	-.086*	.050	.020	.050	.063	.068*
Corn Maze	-.028	-.064	.050	.016	.054	.076*	.095**
Apple Orchard or Pick your own fruit	-.045	-.082*	.063	.057	.034	.072*	.098**
Farm stand, food stand, restaurant on farm	.005	-.079*	.062	.000	.026	.057	.035
Dairy Farm	-.042	-.035	.027	.001	.094**	.098**	.112**
Pig Farm	-.011	-.057	-.013	.054	.069*	.134**	.173**
Horse Farm	-.029	-.083*	.077*	-.002	.042	.114**	.096**
Vineyard or winery tour	.000	-.078*	.012	.041	.091**	.112**	.116**
Animal shelter or rescue organization	.140**	-.113**	-.003	-.028	.060	.062	.046
National or State Park	-.033	-.042	.090**	-.020	-.014	-.015	-.013
Amusement Park	.028	-.042	.061	-.035	-.030	-.037	-.065
Fish Hatchery	.000	-.054	.002	.013	.070*	.131**	.139**
Brewery Tour	-.021	-.052	-.005	.049	.079*	.125**	.130**
Museum of any Kind	-.004	-.067*	.087*	-.009	-.006	-.017	-.042
Food plant or production tour	-.033	-.055	-.005	.074*	.099**	.094**	.121**

Note: Statistical significance (2-tailed) at the 5% and 1% level is represented by * and ** respectively.

Table 3.21 Pearson Correlations between Attributes and Household Lifestyle: 5-State (Passed Validation) Sample (n=915)

	Animal Welfare	Price	Pork/Food Safety	Taste	Environmental Impacts	Locally Raised/Farmed Pigs	Locally Processed Pork
Respondent, a family member or relative do NOT own or operate a farm business in any capacity, including a partnership or part-owner)	.000	.055	.005	-.018	-.051	-.175**	-.140**
Household Production (In the last three years)							
Cultivating fruit trees and/or berries	.001	-.024	-.002	.016	.007	.058	.058
Growing produce of any kind in a personal garden at home.	.029	-.085*	.035	.037	.006	.051	.015
Growing produce of any kind in a personal garden not at home (in a garden plot or community garden)	-.035	-.022	-.022	.015	.136**	.143**	.176**
Raising chickens primarily for eggs	.016	-.046	-.043	.048	.087**	.126**	.105**
Raising chickens primarily for meat	-.014	-.013	-.015	.002	.102**	.079*	.095**
Raising animals (other than chickens) for meat or milk	-.031	.011	-.041	.007	.096**	.117**	.123**
None of the above household production	-.010	.074*	-.033	-.033	-.027	-.069*	-.041
Ever Visited one of the following tourism locations							
Pumpkin Patch	.015	-.055	.016	.027	.060	.016	.030
Corn Maze	.025	-.097**	.051	.007	.108**	.050	.081*
Apple Orchard or Pick your own fruit	.009	-.105**	.073*	.036	.051	.021	.049
Farm stand, food stand, restaurant on farm	.032	-.099**	.052	.016	.043	.068*	.048
Dairy Farm	-.016	-.051	.023	.038	.044	.068*	.027
Pig Farm	-.046	-.034	.003	.057	.091**	.070*	.074*
Horse Farm	.050	-.088**	.000	.031	.116**	.055	.078*
Vineyard or winery tour	.036	-.124**	.068*	.019	.086**	.055	.070*
Animal shelter or rescue organization	.153**	-.102**	.030	-.093**	.070*	.026	.039
National or State Park	.018	-.074*	.065*	-.008	.057	-.007	.018
Amusement Park	.038	-.043	.025	.002	.037	-.056	-.057
Fish Hatchery	-.024	-.052	.043	.031	.070*	.007	.039
Brewery Tour	-.021	-.076*	.011	.105**	.046	.050	.069*
Museum of any Kind	.030	-.070*	.067*	-.020	.073*	-.044	-.011
Food plant or production tour	.011	-.064	-.004	.056	.072*	.066*	.037

Note: Statistical significance (2-tailed) at the 5% and 1% level is represented by * and ** respectively.

Table 3.22 Pearson Correlations between Attributes and Household Lifestyle: Indiana (Passed Validation) Sample (n=701)

	Animal Welfare	Price	Pork/ Food Safety	Taste	Environmental Impacts	Locally Raised/Farmed Pigs	Locally Processed Pork
Respondent, a family member or relative do NOT own or operate a farm business in any capacity, including a partnership or part-owner)	-.001	.031	-.032	.028	-.016	-.100**	-.047
Household Production (In the last three years)							
Cultivating fruit trees and/or berries	.091*	-.038	-.060	-.007	.082*	.053	.048
Growing produce of any kind in a personal garden at home.	.035	-.046	-.037	.033	.062	.119**	.067
Growing produce of any kind in a personal garden not at home (in a garden plot or community garden)	.042	-.057	.003	.044	-.008	-.003	.023
Raising chickens primarily for eggs	-.001	-.002	-.019	.027	-.021	.037	.031
Raising chickens primarily for meat	.018	.016	-.068	.040	-.003	.019	.041
Raising animals (other than chickens) for meat or milk	-.037	-.034	.027	.051	-.029	.094*	.033
None of the above household production	-.042	.052	.045	-.051	-.054	-.115**	-.058
Ever visited one of the following locations							
Pumpkin Patch	.033	.011	-.052	-.012	.028	.042	.072
Corn Maze	.012	.007	-.044	.010	-.014	.089*	.088*
Apple Orchard or Pick your own fruit	-.013	-.060	.022	.040	.057	.093*	.069
Farm stand, food stand, restaurant on farm	.036	-.073	.059	-.041	.046	.070	.064
Dairy Farm	-.072	-.050	.094*	.018	.039	.038	.034
Pig Farm	.001	-.053	.003	.056	-.027	.117**	.130**
Horse Farm	.005	-.018	-.013	-.017	.093*	.088*	.077*
Vineyard or winery tour	-.003	-.057	-.001	.052	.064	.092*	.100**
Animal shelter or rescue organization	.112**	.046	-.081*	-.113**	.032	-.015	.001
National or State Park	-.068	-.018	.050	.016	.013	.072	.068
Amusement Park	-.013	-.055	.081*	-.007	-.019	.040	.011
Fish Hatchery	-.065	.012	-.013	.042	.025	.102**	.057
Brewery Tour	-.021	-.037	-.033	.100**	.032	.080*	.105**
Museum of any Kind	-.066	.040	.025	-.014	.016	-.046	-.035
Food plant or production tour	-.034	-.044	.036	.029	.092*	.015	.081*

Note: Statistical significance (2-tailed) at the 5% and 1% level is represented by * and ** respectively.

3.3.4.1 Pork Attribute Correlations with Fair Oaks Farm Visitor Results

Within the survey respondents indicated if they had heard of FOF and attended FOF. A recap of those who had heard of FOF and been to FOF by survey can be found in table 3.23.

Table 3.23 Response rates for Fair Oaks Farms Visitors by Sample

Sample	**Completed**	**% Heard of FOF**	**% Been to FOF**
National	1004	15%	7%
5-State	1029	18%	7%
Indiana	797	36%	14%

The results from the correlations between the size of shares of preference for pork attributes and those who have heard of FOF and those who have been to FOF can be seen in table 3.24. In the national survey indicating heard of FOF and or indicating had been to FOF were negatively correlated with the size of preference share for the attribute price, and positively correlated with the size of the share of preference for the attributes environmental impacts, locally raised/farmed pigs and locally processed pork

Table 3.24 Pearson Correlations between Shares of Preference for Pork Attributes and Fair Oaks Farms

	Animal Welfare	Price	Pork/ Food Safety	Taste	Environmental Impacts	Locally Raised/Farmed Pigs	Locally Processed Pork
National Sample- Passed Validation (n=857)							
Respondents who have **heard** of Fair Oaks Farms	.057	-.070*	-.052	-.002	.136**	.205**	.243**
Respondents who have **been** to Fair Oaks Farms	.049	-.089**	-.047	.009	.200**	.205**	.270**
5 State Sample- Passed Validation (n=915)							
Respondents who have **heard** of Fair Oaks Farms	.064	-.067*	-.041	.007	.132**	.116**	.156**
Respondents who have **been** to Fair Oaks Farms	-.009	-.077*	-.039	.100**	.120**	.155**	.191**
Indiana Sample – Passed Validation (n=701)							
Respondents who have **heard** of Fair Oaks Farms	-.020	.034	-.026	.006	-.012	.000	.024
Respondents who have **been** to Fair Oaks Farms	-.078*	.028	-.011	.059	.020	-.016	.026

Note: Statistical significance (2-tailed) at the 5% and 1% level is represented by * and ** respectively.

3.3.5 Knowledge about Pork Production and Correlations with Share of Preference for Pork Attributes

Several questions were posed to participants in this study to seek insight on the perceived level of knowledge about food consumption and agriculture in the United States. There were also questions that tested the respondent's knowledge. Regardless of how many people felt they were highly educated about agriculture and food consumption, results indicated that the majority of respondents responded incorrectly to the questions which tested general agricultural knowledge levels. This section looks at how people responded to these questions in the survey and investigates correlations to the size of the shares of preference of pork attributes.

The set of questions which asked people to identify how educated they consider themselves to be about food consumption and agriculture in the United States had a mean score of 5.23 on a seven point scale[3] for how educated of a food consumer/purchaser they consider themselves to be in the national sample. This implies that on average, the sample self-rated as being educated food consumer/purchasers. The national sample respondents had a mean score of 3.92 on a seven point scale[4] for how educated they consider themselves regarding farming and agriculture. This finding implies on average, the sample self-rated as slightly uneducated about farming and agriculture in the United States. In the national sample indicating highly educated about food consumption was negatively correlated to the size of the share of preference for the attribute price and

[3] The seven point scale was defined such that one indicated extremely uneducated and seven indicated extremely educated.
[4] The seven point scale was defined such that one indicated extremely uneducated and seven indicated extremely educated.

positively correlated to the size of the shares of preference for attributes locally raised/farmed pigs and locally processed pork indicating that self-rated educated about agriculture in the United States also had statistically significant negative correlations with the size of the share of preference for the attribute price, and positive correlations with the size of the share of preference for attributes locally raised/farmed pigs and locally processed pork. Results from all three samples are shown in table 3.25.

Table 3.25 Pearson Correlations between Attributes and Self-perceived Level of Education about Food Consumption and Agriculture[5]

	Animal Welfare	Price	Pork/ Food Safety	Taste	Environmental Impacts	Locally Raised/Farmed Pigs	Locally Processed Pork
National (Passed Validation) Sample (n=857)							
What type of food consumer/purchaser do you consider yourself? (A)	.053	-.090**	.005	.030	.052	.073*	.106**
How educated do you consider yourself regarding farming and agriculture in the United States? (B)	.041	-.071*	-.041	.045	.080*	.156**	.171**
5 State (Passed Validation) Sample (n=915)							
A	.082*	-.058	-.061	-.021	.180**	.147**	.136**
B	.020	-.084*	.007	-.008	.158**	.191**	.161**
Indiana (Passed Validation) Sample (n=701)							
A	.081*	-.092*	.048	-.074*	.095*	.096*	.086*
B	.058	-.031	-.034	-.034	.062	.131**	.119**

Note: Statistical significance (2-tailed) at the 5% and 1% level is represented by * and ** respectively.

[5] Respondents could respond on a scale of seven, where one was extremely uneducated, and 7 was extremely educated.

To test knowledge level, respondents were asked to provide an estimate for life expectancy of the following animals: dairy cow on a dairy farm, beef cow on a beef (cow-calf) farm/ranch, egg producing/laying hen, indoor house cat, and pig raised for pork. Results of these responses by sample are displayed in table 3.26. In general the responses were much higher than reality for all livestock animals, but respondents were much more accurate about indoor house cats than any of the farm animals investigated.

Table 3.26 Results from Estimate Life Expectancy for Animals by Sample

	Dairy Cow	**Beef Cow**	**Egg Producing Hen**	**Indoor House Cat**	**Pig raised for Pork**
Mean					
National (n=1004)	10.38	6.06	5.00	12.58	4.09
5-state (n=1029)	10.75	6.23	5.28	13.06	4.04
Indiana (n=797)	10.77	6.01	5.09	13.17	3.52
Median					
National (n=1004)	10	4	5	14	3
5-state (n=1029)	10	5	5	14	3
Indiana (n=797)	10	4	5	14	2
Mode					
National (n=1004)	10	2	5	15	2
5-state (n=1029)	10	5	5	15	2
Indiana (n=797)	10	2	5	15	2

Results from the correlations between the size of the shares of preference for pork attributes and respondents answers to these questions are displayed in table 3.27. Respondents in the national survey who believed the age of the animal was much older than reality, had age expectancy for the animals (other than egg producing/laying hen) correlated with a larger size shares of preference for the attribute pork food safety. This implies that consumers who believe the animal lives longer tended to consider food safety more important than those who do not believe these animals live as long.

Table 3.27 Pearson Correlations between Attributes and How Old Respondents Believe the Following Animals Live to Be

	Animal Welfare	Price	Pork/ Food Safety	Taste	Environmental Impacts	Locally Raised/Farmed Pigs	Locally Processed Pork
National (Passed Validation) Sample (n=857)							
Dairy cow on a dairy farm	-.047	-.019	.079*	.014	-.087*	-.033	-.064
Beef Cow on a Beef (cow-calf) farm/ranch	-.048	-.012	.068*	-.021	-.045	.027	.014
Egg producing/laying hen	-.030	-.023	.053	-.022	.008	.031	.023
Indoor house cat	.009	-.018	.108**	-.065	-.122**	-.113**	-.166**
Pig raised for pork	-.038	-.026	.087*	-.034	-.043	.010	-.003
5 State (Passed Validation) Sample (n=915)							
Dairy cow on a dairy farm	.001	-.009	.001	.044	-.044	-.048	-.051
Beef Cow on a Beef (cow-calf) farm/ranch	-.012	-.013	.012	.035	-.023	-.020	-.041
Egg producing/laying hen	.007	.002	-.001	.010	-.034	-.037	-.006
Indoor house cat	.121**	.037	-.049	-.090**	-.080*	-.069*	-.120**
Pig raised for pork	.041	-.018	-.050	.039	.004	.023	.039
Indiana (Passed Validation) Sample (n=701)							
Dairy cow on a dairy farm	.006	.049	-.019	-.074	.038	-.003	-.049
Beef Cow on a Beef (cow-calf) farm/ranch	-.039	.040	-.010	-.013	.046	-.029	-.022
Egg producing/laying hen	.033	.008	.006	-.043	-.031	-.034	-.042
Indoor house cat	.089*	.004	.004	-.107**	-.017	-.037	-.037
Pig raised for pork	-.013	-.027	.052	.000	-.013	-.026	-.018

Note: Statistical significance (2-tailed) at the 5% and 1% level is represented by * and ** respectively.

Another set of knowledge testing questions was based on the NASS information that states the most common size of pig farm in the United States is between 0-99 pigs. However, the majority of pigs raised for pork are raised on farms of 5,000 plus pigs (USDA-NASS, 2013). Respondents were asked to indicate what they believed was the most common size of a pig farm as well as what size farm the majority of pigs raised for

pork lived on. The results from these questions indicated that the majority of respondents believed that most pig farms were slightly larger than reality and that they believe the majority of pigs raised for pork were raised on farms much smaller than reality.

This analysis examines correlations between respondent's answers to both of these questions with the size of the share of preference for the different pork attributes. The full results are in table 3.28-30 for the three samples. In the national sample, correctly identifying the most common pig farm has less than 99 pigs, was negatively correlated with the size of the share of preference for animal welfare and positively correlated size of share of preference for locally raised/farmed pigs and locally processed pork. This implies that respondents who believed that the most common size pig farm was less than 99 pigs had a smaller share of preference for animal welfare and larger shares of preference for the attributes locally raised/farmed pigs and locally processed pork. Indicating that the majority of pigs for pork were raised on farms with 2,000-4,999 pigs was positively correlated with the size of the share of preference for animal welfare and negative correlated to the size of the share of preference for taste, meaning that people who indicated they believed most of the pigs raised for pork are raised on farms with 2,000-4,999 pigs tended to have a larger share of preference for the attribute animal welfare (or rank animal welfare as more important than those who did not select this response) and relatively less concerned about taste.

Table 3.28 Pearson Correlations between Attributes and Perceptions about Pig Farm Size in the United States (National (Passed Validation) Sample (n=857))

	Animal Welfare	Price	Pork/ Food Safety	Taste	Environmental Impacts	Locally Raised/Farmed Pigs	Locally Processed Pork
Respondent believes that the most common pig farm size in the US has less than 99 pigs	-.078*	-.027	.062	.013	.017	.067*	.100**
100-499 pigs	.033	.027	.010	-.063	-.032	-.063	-.128**
500-999 pigs	.017	-.035	-.019	.064	-.009	.007	.059
1000-1999 pigs	-.013	.010	-.036	.026	.068*	.022	.046
2000-4999	.067*	.006	-.035	-.032	-.041	.014	-.018
5000 or more pigs	-.038	.038	.011	-.020	-.002	-.028	-.046
Respondent believes that the majority of pigs raised for pork in the US live on farms that have less than 99 pigs	-.042	-.012	.005	.039	.033	.040	.070*
100-499 pigs	-.010	.031	.006	-.023	-.047	-.020	-.062
500-999 pigs	-.036	-.007	.010	.046	-.011	.000	.016
1000-1999 pigs	.039	-.041	-.011	.003	.065	.035	.027
2000-4999 pigs	.080*	-.034	.017	-.077*	.002	.000	.007
5000 or more pigs	-.012	.059	-.032	-.006	-.026	-.055	-.035

Note: Statistical significance (2-tailed) at the 5% and 1% level is represented by * and ** respectively.

Table 3.29 Pearson Correlations between Attributes and Perceptions about Pig Farm Size in the United States (5-State (Passed Validation) Sample (n=915))

	Animal Welfare	Price	Pork/ Food Safety	Taste	Environmental Impacts	Locally Raised/Farmed Pigs	Locally Processed Pork
Respondent believes that the most common pig farm size in the US has							
less than 99 pigs	-.043	-.001	.043	-.013	.017	.001	.015
100-499 pigs	-.016	-.031	.051	.002	-.024	.002	.005
500-999 pigs	.036	.021	-.034	-.035	.021	.001	-.023
1000-1999 pigs	.001	.019	-.044	.039	-.020	-.008	-.006
2000-4999	.010	.018	-.046	.018	.015	.008	-.006
5000 or more pigs	.030	-.022	-.008	.009	.001	-.004	.030
Respondent believes that the majority of pigs raised for pork in the US live on farms							
that have less than 99 pigs	-.001	-.001	.008	-.006	-.025	.005	.024
100-499 pigs	.014	-.017	.060	-.059	-.032	-.018	-.038
500-999 pigs	-.005	.016	.002	-.029	-.013	.026	.003
1000-1999 pigs	-.003	-.009	-.053	.087**	.044	-.016	.014
2000-4999 pigs	-.005	.052	-.021	-.038	-.001	-.031	-.047
5000 or more pigs	-.003	-.043	-.016	.071*	.041	.038	.063

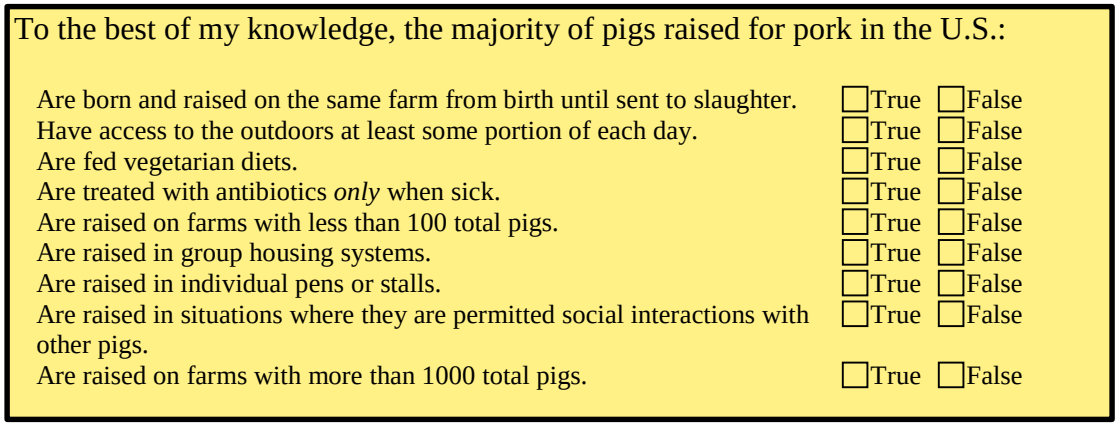
Note: Statistical significance (2-tailed) at the 5% and 1% level is represented by * and ** respectively.

Table 3.30 Correlations between Attributes and Perceptions about Pig Farm Size in the United States (Indiana (Passed Validation) Sample (n=701))

	Animal Welfare	Price	Pork/ Food Safety	Taste	Environmental Impacts	Locally Raised/Farmed Pigs	Locally Processed Pork
Respondent believes that the most common pig farm size in the US has							
less than 99 pigs	.008	.004	-.001	-.008	.007	-.039	.005
100-499 pigs	-.014	-.028	.042	.035	-.080*	-.004	.000
500-999 pigs	-.042	.013	.021	.000	.009	-.016	.004
1000-1999 pigs	.066	-.007	-.038	-.027	.010	.032	-.033
2000-4999	.011	-.002	-.028	-.031	.123**	.067	.040
5000 or more pigs	-.008	.058	-.059	.008	-.009	-.035	-.018
Respondent believes that the majority of pigs raised for pork in the US live on farms							
that have less than 99 pigs	-.001	-.026	.018	.027	-.015	-.003	-.003
100-499 pigs	-.023	.060	-.017	-.011	-.073	-.040	-.076*
500-999 pigs	.062	-.087*	.012	.030	.006	.066	.083*
1000-1999 pigs	-.049	-.009	.040	.023	.004	-.023	.008
2000-4999 pigs	.003	-.001	.021	-.062	.069	.023	.011
5000 or more pigs	.001	.083*	-.094*	-.013	.042	-.037	-.031

Note: Statistical significance (2-tailed) at the 5% and 1% level is represented by * and ** respectively.

Consumers have perceptions about what practices are used versus not used for raising pigs. One question asked respondents to identify statements regarding production process as true or false. Indicating true meant that the participant believed the practice was used for the majority of pigs raised for pork. The question in the survey is shown in figure 3.3.


To the best of my knowledge, the majority of pigs raised for pork in the U.S.:

Are born and raised on the same farm from birth until sent to slaughter.	☐True	☐False
Have access to the outdoors at least some portion of each day.	☐True	☐False
Are fed vegetarian diets.	☐True	☐False
Are treated with antibiotics *only* when sick.	☐True	☐False
Are raised on farms with less than 100 total pigs.	☐True	☐False
Are raised in group housing systems.	☐True	☐False
Are raised in individual pens or stalls.	☐True	☐False
Are raised in situations where they are permitted social interactions with other pigs.	☐True	☐False
Are raised on farms with more than 1000 total pigs.	☐True	☐False

Figure 3.3 Pork Production Knowledge Testing Questions

While the majority of respondents were incorrect in their responses, this analysis examines correlations between indicating the statement was true with the size of the preference share for the different pork attributes. This allows for insight regarding those who correctly or incorrectly believe the practice takes place on the majority of pig farms which are raising pigs for pork in the United Stated and their share of preference for the different pork attributes. Correlation results are displayed in table 3.31, 3.32 and 3.33 for the national, 5-state and Indiana samples respectively. In the national sample indicating true for “are born and raised on the same farm from birth until sent to slaughter”, “have access to the outdoors at least some portion of each day”, “are fed vegetarian diets”, “are

treated with antibiotic only when sick" or "are raised in situations where they are permitted social interactions with other pigs" was negatively correlated with the size of the preference share for animal welfare. In the national sample the size of the share of preference for price was positively correlated with indicating "are born and raised on the same farm from birth until sent to slaughter" as true, "are treated with antibiotics only when sick" as true, and "are raised in situations where they are permitted social interactions with other pigs" as true. Indicating "Are raised on farms with less than 100 total pigs" as true was positively correlated with the size of preference share for environmental impacts, locally raised pigs and locally processed pork.

Table 3.31 Correlations between Share of Preference for Pork Attributes and Knowledge of Production Practices for the National (Passed Validation) Sample (n=857)

	Animal Welfare	Price	Pork/ Food Safety	Taste	Environmental Impacts	Locally Raised/Farmed Pigs	Locally Processed Pork
Are born and raised on the same farm from birth until sent to slaughter.	-.110**	.101**	-0.029	0.037	-0.034	-0.028	0.013
Have access to the outdoors at least some portion of each day.	-.158**	0.053	0.059	0.031	-0.052	0.021	0.001
Are fed vegetarian diets.	-.113**	0.029	0.048	0.027	-0.03	0.017	-0.017
Are treated with antibiotics only when sick.	-.084*	.103**	-0.043	-0.02	0.021	0.035	0.051
Are raised on farms with less than 100 total pigs.	-0.029	-0.002	-0.039	0.016	.140**	.088**	.156**
Are raised in group housing systems.	-0.066	0.027	0.019	0.061	-0.046	-.099**	-0.062
Are raised in individual pens or stalls.	0.061	0.01	-.099**	0.004	.086*	.070*	.098**
Are raised in situations where they are permitted social interactions with other pigs.	-.129**	.114**	0.003	0.02	-.098**	-0.043	-0.058
Are raised on farms with more than 1000 total pigs.	.088**	-0.037	-0.019	-0.059	0.038	.067*	0.039

Note: Statistical significance (2-tailed) at the 5% and 1% level is represented by * and ** respectively.

Table 3.32 Correlations between Share of Preference for Pork Attributes and Knowledge of Production Practices for the 5-State (Passed Validation) Sample (n=915)

	Animal Welfare	Price	Pork/ Food Safety	Taste	Environmental Impacts	Locally Raised/Farmed Pigs	Locally Processed Pork
Are born and raised on the same farm from birth until sent to slaughter.	-.107**	.066*	0.03	0	-0.036	-0.03	-0.029
Have access to the outdoors at least some portion of each day.	-0.052	0.054	-0.004	0.025	-.096**	-0.052	-0.056
Are fed vegetarian diets.	-0.023	-0.009	0.017	0.027	-0.044	0.016	-0.007
Are treated with antibiotics only when sick.	-0.01	-0.007	-0.015	0.038	-0.007	0.022	0.029
Are raised on farms with less than 100 total pigs.	-0.016	-0.022	-0.011	0.05	0.005	0.046	.073*
Are raised in group housing systems.	-.092**	.081*	0.014	-0.003	-0.034	-.068*	-.089**
Are raised in individual pens or stalls.	0.056	-.073*	-.089**	.092**	.125**	.139**	.147**
Are raised in situations where they are permitted social interactions with other pigs.	-.107**	0.028	.068*	0.048	-.121**	-.071*	-.088**
Are raised on farms with more than 1000 total pigs.	0.051	0.046	-.122**	-0.008	.109**	0.022	.074*

Note: Statistical significance (2-tailed) at the 5% and 1% level is represented by * and ** respectively.

Table 3.33 Correlations between Share of Preference for Pork Attributes and Knowledge of Production Practices for the Indiana Passed Validation Sample (n=701)

	Animal Welfare	Price	Pork/ Food Safety	Taste	Environmental Impacts	Locally Raised/Farmed Pigs	Locally Processed Pork
Are born and raised on the same farm from birth until sent to slaughter.	-0.029	.105**	-0.053	-0.01	-.109**	-0.063	-.109**
Have access to the outdoors at least some portion of each day.	-0.056	0.016	0.056	0.001	-.090*	-0.018	-0.052
Are fed vegetarian diets.	-0.073	0.06	0.026	-0.029	-0.057	-0.001	-0.019
Are treated with antibiotics only when sick.	-.084*	0.054	0	0.028	-0.06	0.012	0.012
Are raised on farms with less than 100 total pigs.	-0.05	0.034	-0.014	0.028	-0.056	0.053	0.005
Are raised in group housing systems.	-0.048	.127**	-0.07	-0.02	-.124**	0.015	-0.062
Are raised in individual pens or stalls.	0.059	0.018	-0.025	-.096*	0.072	-0.003	0.032
Are raised in situations where they are permitted social interactions with other pigs.	-.111**	-0.019	.106**	0.04	-.076*	0.019	0.02
Are raised on farms with more than 1000 total pigs.	-0.022	.075*	-.095*	0.008	0.041	0.032	0.045

Note: Statistical significance (2-tailed) at the 5% and 1% level is represented by * and ** respectively.

3.3.6 Perceptions of Agriculture and Growth

It has been hypothesized that consumers' perspective on growth of agriculture and livestock operations has some relationship to the importance level of attributes such as environmental impact. This part of the analysis examined the correlations between perspectives on growth of livestock operations and the size of the share of preference for the different pork attributes. To examine these relationships, participants were presented a series of statements about agriculture and growth and were asked to agree or disagree on a scale of seven, where one was strongly disagree and seven was strongly agree.

Correlations examined between responses to the statements provided and the share of preference for attributes found that indicating agreement to the first four statements listed (I would oppose the building of new livestock operations in my county, I believe that livestock farms are environmentally harmful, I would oppose the growth of livestock operations in my county, and I am concerned about impacts on water quality from livestock operations in my county) was positively correlated with the size of the share of preference for animal welfare, environmental impacts, locally raised/farmed pigs, and locally processed pork. Indicating agreement with these four statements was negatively correlated with the size of the share of preference for price. This finding implies that the participants who strongly agreed to the four statements tended to have larger share of preference for (find more important) animal welfare, environmental impacts, locally raised/farmed pigs and locally processed pork and tended to have less concern (or smaller preference share) for price. The full results for the National, 5-staate and Indiana samples can be found in table 3.34, 3.35 and 3.36 respectively.

Table 3.34 Pearson Correlations between Pork Attributes and Perceptions of Agriculture and Livestock Growth (National (Passed Validation) Sample (n=857))

	Animal Welfare	Price	Pork/ Food Safety	Taste	Environmental Impacts	Locally Raised/Farmed Pigs	Locally Processed Pork
I would oppose the building of new livestock operations in my county.	.129**	-.074*	-.066	-.050	.179**	.132**	.141**
I believe that livestock farms are environmentally harmful.	.191**	-.098**	-.093**	-.051	.221**	.122**	.103**
I would oppose the growth of livestock operations in my county.	.150**	-.085*	-.070*	-.051	.184**	.122**	.161**
I am concerned about impacts on water quality from livestock operations in my county.	.135**	-.133**	-.008	-.065	.219**	.137**	.165**
I have experienced negative impacts from livestock operations located near my home or work.	.018	-.009	-.110**	.054	.165**	.141**	.189**
I am supportive of the growth of livestock agriculture in my county.	-.149**	-.020	.077*	.082*	-.025	.077*	.097**
I am supportive of the growth of livestock agriculture in my state, but would prefer growth outside of my county/region.	-.045	-.004	-.015	.014	.076*	.121**	.144**
Agriculture is an important industry in my state.	-.032	-.026	.058	.017	-.071*	.003	-.005
Odor/smell from livestock operations is a major concern for me.	.051	-.011	-.031	-.052	.086*	.063	.055
I feel that livestock operations make good neighbors.	-.023	-.007	-.045	.052	.032	.134**	.135**

Note: Statistical significance (2-tailed) at the 5% and 1% level is represented by * and ** respectively.

Table 3.35 Pearson Correlations between Pork Attributes and Perceptions of Agriculture and Livestock Growth (5-State (Passed Validation) Sample (n=915))

	Animal Welfare	Price	Pork/ Food Safety	Taste	Environmental Impacts	Locally Raised/Farmed Pigs	Locally Processed Pork
I would oppose the building of new livestock operations in my county.	.126**	-.063	-.040	-.094**	.214**	.093**	.170**
I believe that livestock farms are environmentally harmful.	.143**	-.122**	-.036	-.025	.237**	.082*	.191**
I would oppose the growth of livestock operations in my county.	.146**	-.067*	-.050	-.084*	.199**	.060	.167**
I am concerned about impacts on water quality from livestock operations in my county.	.108**	-.147**	.079*	-.089**	.180**	.094**	.114**
I have experienced negative impacts from livestock operations located near my home or work.	.027	-.075*	-.014	.005	.208**	.103**	.216**
I am supportive of the growth of livestock agriculture in my county.	-.075*	-.024	.032	.075*	-.042	.067*	.043
I am supportive of the growth of livestock agriculture in my state, but would prefer growth outside of my county/region.	-.004	.004	-.035	.009	.080*	.040	.077*
Agriculture is an important industry in my state.	.038	-.032	-.046	.066*	-.005	.023	.015
Odor/smell from livestock operations is a major concern for me.	.040	-.076*	.038	-.023	.122**	.026	.060
I feel that livestock operations make good neighbors.	-.002	.004	-.074*	.054	.002	.117**	.134**

Note: Statistical significance (2-tailed) at the 5% and 1% level is represented by * and ** respectively.

Table 3.36 Pearson Correlations between Pork Attributes and Perceptions of Agriculture and Livestock Growth (Indiana (Passed Validation) Sample (n=701))

	Animal Welfare	Price	Pork/ Food Safety	Taste	Environmental Impacts	Locally Raised/Farmed Pigs	Locally Processed Pork
I would oppose the building of new livestock operations in my county.	.098**	-.088*	.009	-.027	.129**	-.006	.030
I believe that livestock farms are environmentally harmful.	.129**	-.078*	-.034	-.049	.191**	.000	.103**
I would oppose the growth of livestock operations in my county.	.151**	-.090*	-.016	-.051	.121**	-.009	.026
I am concerned about impacts on water quality from livestock operations in my county.	.117**	-.139**	.013	-.019	.214**	.043	.164**
I have experienced negative impacts from livestock operations located near my home or work.	.086*	.002	-.064	-.074*	.119**	.030	.098**
I am supportive of the growth of livestock agriculture in my county.	-.101**	-.003	.062	.045	-.029	.023	.026
I am supportive of the growth of livestock agriculture in my state, but would prefer growth outside of my county/region.	-.023	.028	-.009	.001	.009	-.036	-.017
Agriculture is an important industry in my state.	.010	-.043	.076*	-.058	.042	-.005	.001
Odor/smell from livestock operations is a major concern for me.	.039	-.048	.018	-.006	.058	-.019	.004
I feel that livestock operations make good neighbors.	-.093*	.019	.024	.027	-.029	.097*	.080*

Note: Statistical significance (2-tailed) at the 5% and 1% level is represented by * and ** respectively.

Eighty-three percent of the national sample, 85% of the 5-state sample, and 90% of the Indiana sample indicated they had purchased pork within the last year. Those who purchased pork have statistically significant negative correlations to the size of the share of preference for attributes animal welfare and environmental impacts. They also have positive correlations to the size of share of preference for attributes pork food safety and taste. A full recap of results can be found in table 3.37.

Table 3.37 Pearson Correlations for Size of Preference Share For Pork Attributes with People Who Have Purchased Pork in the Last Year.

	Animal Welfare	Price	Pork/ Food Safety	Taste	Environmental Impacts	Locally Raised/Farmed Pigs	Locally Processed Pork
National (Passed Validation) Sample (n=857)							
Purchased pork in the last year	-.120**	-.023	.108**	.069*	-.114**	-.028	-.003
5 State (Passed Validation) Sample (n=915)							
Purchased pork in the last year	-.149**	.027	.073*	.065*	-.061	-.034	-.048
Indiana (Passed Validation) Sample (n=701)							
Purchased pork in the last year	-.093*	.027	.044	.088*	-.210**	-.032	-.034

Note: Statistical significance (2-tailed) at the 5% and 1% level is represented by * and ** respectively.

McKendree, Croney, and Widmar (2014) examined relationships between national household consumers reported concern for animal welfare and primary sources of animal welfare information. Their study found that individual's level of concern for animal welfare was better correlated with having or not having a source rather than which source was used. (McKendree, Croney, and Widmar, 2014). This analysis had 46% of the national sample, 44% of the 5-state sample and 37% of the Indiana sample indicate they

had a primary source for animal welfare information. In all three samples, indicating having a source for animal welfare information was positively correlated with the size of the share of preference for the attribute animal welfare, which imitates the findings from McKendree, Croney, and Widmar (2014). This analysis also found that indicating having a source for animal welfare information was positively correlated with the size of the share of preference for attributes environmental impacts, and locally processed pork. Also, it was negatively correlated with the size of the preference share for the attribute price. Full results are displayed in table 3.38.

Table 3.38 Pearson Correlations for Size of Preference Share for Pork Attributes with Having a Source for Animal Welfare Informaiton

	Animal Welfare	Price	Pork/ Food Safety	Taste	Environmental Impacts	Locally Raised/Farmed Pigs	Locally Processed Pork
National (Passed Validation) Sample (n=857)							
Has a source for animal welfare information	.139**	-.104**	-.043	-.038	.149**	.135**	.132**
5 State (Passed Validation) Sample (n=915)							
Has a source for animal welfare information	.238**	-.141**	-.070*	-.091**	.228**	.177**	.193**
Indiana (Passed Validation) Sample (n=701)							
Has a source for animal welfare information	.166**	-.110**	-.027	-.039	.115**	.047	.148**

Note: Statistical significance (2-tailed) at the 5% and 1% level is represented by * and ** respectively.

The survey asked respondents to indicate how strongly they agreed that a set of practices seriously reduced the animal welfare of pigs. The scale respondents answered on was out of seven, where seven indicated they strongly agreed that the practice

seriously reduced the animal welfare and a one meant that they strongly disagreed that the statement seriously reduced the animal's welfare. For all production practices examined, the national sample results include that indicating agreement (i.e. believing the practice reduces the welfare treatment of pigs) was positively correlated with the size of the shares of preference for attributes animal welfare and environmental impacts, and negatively correlated with the size of the shares of preference for attributes price and taste.

Most participants indicated a level of disagreement with the practices of ear notching for identification, tail docking and teeth clipping (implying they were less concerned about these practices reducing animal welfare). That said, indicating agreement (implying belief that these practices did seriously reduce animal welfare) was positively correlated with the size of the preference share for locally raised/farmed pigs and locally processed pork. All results of this section can be seen in tables 3.39-41 for National, 5-state and Indiana sample respectively.

Table 3.39 Pearson Correlations between Attributes and Perceptions of Agriculture and Livestock Growth. (National (Passed Validation) Sample (n=857))

	Animal Welfare	Price	Pork/ Food Safety	Taste	Environmental Impacts	Locally Raised/Farmed Pigs	Locally Processed Pork
Castration(neutering) of male pigs	.124**	-.071*	-.054	-.043	.137**	.115**	.097**
Confining hogs indoors	.156**	-.118**	.025	-.092**	.117**	.030	.010
Use of farrowing crates (A crate or cage in which a sow is individually confined at time of farrowing (giving birth to piglets).)	.191**	-.089**	-.047	-.086*	.135**	.045	.046
Use of gestation crates (A crate or cage in which a sow is individually confined during the animal's four-month pregnancy until the time of farrowing (giving birth to piglets).)	.171**	-.098**	.011	-.116**	.104**	.020	-.011
Housing sows in group pens (A pen in which a group of sows is placed during the animal's four-month pregnancy until the time of farrowing (giving birth to piglets).)	.146**	-.076*	-.035	-.075*	.138**	.058	.059
Ear notching for identification	.132**	-.077*	-.045	-.077*	.149**	.137**	.157**
Tail docking	.171**	-.102**	-.032	-.080*	.119**	.107**	.104**
Teeth clipping	.167**	-.099**	-.012	-.095**	.107**	.075*	.057

Note: Statistical significance (2-tailed) at the 5% and 1% level is represented by * and ** respectively.

Table 3.40 Pearson Correlations between Attributes and Perceptions of Agriculture and Livestock Growth. (5-State (Passed Validation) Sample (n=915))

	Animal Welfare	Price	Pork/Food Safety	Taste	Environmental Impacts	Locally Raised/Farmed Pigs	Locally Processed Pork
Castration (neutering) of male pigs	.107**	-.094**	-.056	.026	.134**	.093**	.148**
Confining hogs indoors	.126**	-.099**	-.008	-.022	.089**	.047	.072*
Use of farrowing crates (A crate or cage in which a sow is individually confined at time of farrowing (giving birth to piglets).)	.135**	-.083*	-.069*	.018	.092**	.072*	.083*
Use of gestation crates (A crate or cage in which a sow is individually confined during the animal's four-month pregnancy until the time of farrowing (giving birth to piglets).)	.111**	-.089**	-.019	.004	.066*	.041	.050
Housing sows in group pens (A pen in which a group of sows is placed during the animal's four-month pregnancy until the time of farrowing (giving birth to piglets).)	.135**	-.068*	-.051	-.018	.074*	.044	.065*
Ear notching for identification	.129**	-.085**	-.042	-.018	.104**	.078*	.117**
Tail docking	.092**	-.079*	-.011	-.018	.076*	.074*	.106**
Teeth clipping	.094**	-.092**	-.005	-.002	.090**	.052	.091**

Note: Statistical significance (2-tailed) at the 5% and 1% level is represented by * and ** respectively.

Table 3.41 Pearson Correlations between Attributes and Perceptions of Agriculture and Livestock Growth. (Indiana (Passed Validation) Sample (n=701))

	Animal Welfare	Price	Pork/ Food Safety	Taste	Environmental Impacts	Locally Raised/Farmed Pigs	Locally Processed Pork
Castration (neutering) of male pigs	.144**	-.037	-.033	-.065	.082*	-.099**	-.077*
Confining hogs indoors	.150**	-.124**	.075*	-.097*	.073	-.025	-.010
Use of farrowing crates (A crate or cage in which a sow is individually confined at time of farrowing (giving birth to piglets).)	.145**	-.058	-.018	-.053	.051	-.064	-.043
Use of gestation crates (A crate or cage in which a sow is individually confined during the animal's four-month pregnancy until the time of farrowing (giving birth to piglets).)	.168**	-.121**	.046	-.088*	.093*	-.032	-.012
Housing sows in group pens (A pen in which a group of sows is placed during the animal's four-month pregnancy until the time of farrowing (giving birth to piglets).)	.129**	-.110**	.036	-.018	.057	-.076*	-.050
Ear notching for identification	.101**	-.019	-.057	-.018	.035	-.026	.005
Tail docking	.143**	-.066	-.028	-.042	.083*	-.043	.009
Teeth clipping	.143**	-.097*	.008	-.032	.067	-.047	.004

Note: Statistical significance (2-tailed) at the 5% and 1% level is represented by * and ** respectively.

3.4 Conclusions

The national sample of consumers, when forced to make tradeoffs between seven attributes of pork products, revealed the relative rankings of importance from most to least important: food safety, taste, animal welfare, price, environmental impacts, locally raised/farmed pigs, and locally processed pork. The mean share of preference for animal welfare was 15%. The preference shares for price by individual respondents were negatively correlated with the size of shares for all other attributes, displaying a tradeoff of price for other attributes. The size of the shares of preference for animal welfare and pork food safety are negatively correlated. This finding is contrary to a hypothesis by some that consumers would identify animal welfare and food safety as part of the same issue. If the argument is that animal welfare is important for healthy food, it is interesting that food safety (which many would thing would include healthy food) attribute is negatively correlated with the size of the share for animal welfare. While food safety may indeed be related to animal welfare, these findings clearly indicate that there is more to food safety and animal welfare relationship.

The examination of correlations between demographics, perspectives and participation in agritourism with the preference shares for pork attributes lead to several interesting insights. Demographics that tended to be positively correlated with animal welfare were female, people in the age category of 25-44, individuals with high income, vegetarians and vegans, and pet ownership.

Participants that indicated they were educated about food consumption tended to have smaller shares of preference for price and larger shares of preference for locally raised/farmed pigs and locally processed pork. Indicating having a source for animal

welfare information was positively correlated with the size of the shares of preference for animal welfare and environmental impacts and locally processed pork and negatively correlated with the size of the shares of preference for price. People who have been to agritourism locations tended to care about locally raised/farmed pigs and locally processed pork, and had no different preference share sizes for environmental impacts. The only tourism activity that had correlations to animal welfare was attending animal shelters/rescue organizations.

Overall the trend was seen throughout the results that people who tended to have larger shares of preference of animal welfare also tended to have larger shares of preference for environmental impacts, locally raised/farmed pigs and locally processed pork. They also tended to have smaller size of shares of preference for price, pork food safety, and taste.

CHAPTER 4. CONCLUSIONS

Given consumers' increased ability to make purchase decisions in the supermarket based on how the livestock animal lived its life, this study expanded current understanding about what factors may be related to consumer's thoughts, and ultimately their preference for different pork product attributes. This analysis examined the United States consumer's demographics, views, and perceptions and re-affirmed previous findings which indicated that the majority of United States consumers do not have a primary source for animal welfare information.

People consider themselves to be educated about food consumption. However, there is a clear gap in consumer's mind between being educated about food consumption and being educated about agriculture. When tested, the knowledge base regarding pork production shows that the majority of consumers are not knowledgeable about production practices, however respondents generally indicated having positive sentiments about the importance of agriculture in their state and growth of livestock operations.

The multitude of factors that impact consumers' preferences for livestock food products is still not completely understood. What this analysis did was provided insight on tendencies between pork attribute preference and demographics, knowledge level, and agritourism participation. Given that this survey is limited to correlative relationships

(and could not determine causal relationships) determining factors impact was not obtainable. The deeper understanding of the tendencies was accomplished through the examination of responses to a series of questions that forced tradeoffs between pork attributes and ultimately determined relative importance of these attributes. The results of this analysis provided a relative cardinal ranking (from most to least importation) between the seven attributes such that the following ranking was found: pork food safety, taste, animal welfare, price, environmental impacts, locally raised pigs, and locally processed pork.

To gain better understanding of the true impact of visiting educationally oriented livestock operations on purchasing behaviors, perceptions, and attitudes of United States residents, correlations where completed between the preference share for pork attributes and the attendance of agritourism, demographics and other factors. What we learned from this analysis is that consumers who had visited agritourism locations tended to have larger preference shares for locally raised/farmed pigs and locally processed pork. No individual livestock operation type had statistically significant correlations with the size of the share of preference for animal welfare. When consumers who had visited pig farms, dairy farms, and horse farms in the past ten years were combined, correlation results indicated that having visited was positively correlated with animal welfare. This implies that those who visited livestock operations find animal welfare to be more important or of higher concern than those who had not visited at least one of the three livestock operation types. Of all tourism locations examined individually, animal shelter/rescue organizations were the only operations where visiting was positively correlated with the size of the share of preference for animal welfare. When this result is

combined with McKendree and Widmar (2013) finding that pet owners tend to care more about animal welfare, it provides deeper insight that people who are more closely associated with animals (regardless of if they are livestock animals or pets) tend have larger shares of preference for animal welfare. Those who identified as having visited tourism locations tended to have larger correlations with local processed pork and locally farmed/raised pigs.

The hypothesis proposed by some in the agriculture industry was that if consumers see how livestock animals are raised, they will be less concerned about animal welfare, and the current production processes, and will thus make purchase decisions differently at the supermarkets. However, at minimum, these findings challenge that hypothesis. These findings did not support the idea that additional information will lead to more positive outlooks by consumers; it is entirely possible that increased exposure to how animals are raised (or simply more animal exposure of any kind) will actually increase consumers' concern for the welfare of animals.

From a market and economic standpoint, the logical next topic of interest is to better understand what consumers are ultimately willing to pay for different production practices. Additional analyses are needed to determine what practices are of concern and how much people are willing to pay for different products produced with certain practices of animal treatment. This future research has the potential to help producers properly allocate resources and provide products that the consumers demand.

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